

# OFFICE UROLOGY

## *With a Section on Cystoscopy*

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DEDICATED  
TO  
ALEXANDER RANDALL  
AND  
ANSON L. CLARK  
IN  
SINCERE ADMIRATION OF THEIR WORK  
AND  
DEEP APPRECIATION OF THEIR FRIENDSHIP

## PREFACE

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A FEW years ago there came into my office the editorial head of W B Saunders Company. After a few *pleasantries* he unburdened himself of a brain-child in about this manner: "I have an idea for a book and you are the only one to write it. The book is on Office Urology. In other words, take your office here, what do you do in it? For many years you have done nothing but diagnostic and nonsurgical urology. I want in book form what that has taught you. And when you have done that you can add a large section on cystoscopy." The answer was a flat refusal. But one does not know this publisher who thinks that finishes something on which he has set his mind. Within a few moments he had me steeped in grief about the way in which I was holding out on a *hungering* profession. Also, he had my agreement to see what I could do about fulfilling that "great need."

So far as it was sanely possible I have tried to comply with his wish. But one who scans the following pages soon will discover that it repeatedly has been necessary to go far beyond the confines of a single office. Life is not long enough nor are its opportunities sufficiently wide for one to confine his writings to his own office. Indeed, he would be conceited beyond measure who even suspected that he could or should accomplish such a feat.

Throughout the book I have tried carefully to adhere to simplicity and commonsense. I have not hesitated to give expression to my personal views upon many things. I have spoken frankly, perhaps too much so at times, and in doing so it is possible that I may have trod on some protruding toes. If so, I trust any wounds thus occasioned will heal rapidly. One cannot spend years at office urology without feeling that there are many operations performed that rather easily might have been avoided by early attention to little things. It is of these little things I have tried to write, and always with an effort not to weigh matters down with a burden of theory that fails to help.

He who has a tendency to be carried away by the enthusiasm of the moment will encounter herein much that savors of pessimism. This is always so of the writings of one who tries to steer a safe and sane course amid the countless "great discoveries" that so frequently flash across the medical skies, most of which live but a short while and serve only to disturb orderly thinking and procedure. It is equally so of the products of the pen of him who is imbued with the conviction that those who care for the ills of mankind should know, perhaps, more about what is wrong with a therapeutic measure than what is right. The medical literature of the day seldom leaves one un instructed about the latter, though it does rather frequently deal slightly or not at all with the former. One gains little by curing disease in one group of organs if he greatly injures others or perhaps kills the patient. Thus it is often the case that I have featured what is wrong just as emphatically as I have extolled the virtues of a procedure. In excuse of this I only can say that it is born of an effort to be honest and helpful.

# CONTENTS

---

|   | PAGE |
|---|------|
| INTRODUCTION  | 1    |
| Office Arrangement  | 3    |
| Equipment   | 10   |
| The Sterilization of Instruments                                  | 23   |
| Care of the Hands   | 25   |
| CHAPTER I   |      |
| ANATOMIC STRUCTURE AND PHYSIOLOGIC FUNCTION                       | 26   |
| The Kidney  | 26   |
| The Renal Pelvis  | 33   |
| The Ureter  | 34   |
| The Bladder   | 38   |
| The Urethra   | 44   |
| The Prostate Gland  | 50   |
| The Seminal Vesicle   | 53   |
| The Vas Deferens  | 55   |
| The Epididymis  | 56   |
| The Testes  | 58   |
| The Penis   | 60   |
| Physiology of the Genital System                                  | 64   |
| The Relation of Anatomic Structure to Urogenital Infection        | 66   |
| The Relation of Surface Histology to Urogenital Infection         | 68   |
| CHAPTER II  |      |
| HISTORY TAKING, EXAMINATION OF THE PATIENT, AND OFFICE PROCEDURES | 72   |
| History-taking  | 72   |
| Examination of the Patient  | 75   |
| Office Laboratory Procedures and Microscopic Interpretation       | 77   |
| CHAPTER III   |      |
| GENERAL DIAGNOSTIC METHODS  | 125  |
| Inspection  | 125  |
| Palpation   | 125  |
| Roentgenography in Diagnosis                                      | 130  |
| Renal Function Tests  | 137  |
| Blood Chemistry   | 140  |
| Urethroscopy  | 142  |
| Cystometry  | 147  |
| Instrumental Examination of the Urethra                           | 151  |
| Dark-field Examinations   | 153  |



|   |      |
|---|------|
| CHAPTER IV                                      | PAGE |
| UROGENITAL SYMPTOMS                             | 155  |
| The Psychic Factors of Urogenital Symptoms      | 156  |
| Pain  | 165  |
| Frequency of Urination                          | 170  |
| Incontinence of Urine                           | 173  |
| Polyuria  | 174  |
| Anuria  | 175  |
| Dysuria   | 177  |
| Vesical Tenesmus                                | 178  |
| Pyuria  | 179  |
| Hematuria                                       | 181  |
| Oxaluria  | 183  |
| Phosphaturia                                    | 184  |
| Bacteruria                                      | 185  |
| Chyluria  | 186  |
| Pneumaturia                                     | 187  |
| Hemospermia                                     | 187  |
| Spermatorrhea                                   | 189  |
| Prostatorrhea                                   | 190  |
| Enuresis in Children                            | 191  |
| CHAPTER V                                       |      |
| GENERAL METHODS OF TREATMENT                    | 193  |
| Local Medication of the Urinary Structures      | 195  |
| The Means Whereby Local Medicaments Are Applied | 201  |
| Urethral Instrumentation                        | 209  |
| External Heat and Cold                          | 227  |
| Scrotal Support and Pressure                    | 234  |
| Surface Fulguration                             | 238  |
| Prostatic Massage                               | 238  |
| Massage of Cowper's Glands                      | 244  |
| Prolonged Hyperthermia                          | 245  |
| Internal Medicaments Used in Urologic Practice  | 245  |
| Vaccines  | 253  |
| Nonspecific Proteins                            | 255  |
| Urinary Antiseptics                             | 256  |
| Diet in Urologic Practice                       | 263  |
| The Endocrine Glands in Urology                 | 272  |
| CHAPTER VI                                      |      |
| ANESTHESIA AND MINOR SURGICAL PROCEDURES        | 277  |
| Anesthesia                                      | 277  |
| Minor Surgical Procedures                       | 281  |
| CHAPTER VII                                     |      |
| DISEASES OF THE PENIS                           | 287  |
| Malformations of the Penis                      | 287  |
| Balanoposthitis                                 | 287  |

|   | PAGE |
|---|------|
| Phimosis  | 288  |
| Paraphimosis                                      | 290  |
| Lymphangitis of the Penis                         | 292  |
| Herpes Progenitalis                               | 292  |
| Penile Papilloma                                  | 293  |
| Para-urethral Sinusitis                           | 294  |
| Chancroid   | 295  |
| Erosive or Gangrenous Balanitis                   | 298  |
| Granuloma Inguinale                               | 300  |
| Lymphopathia Venereum                             | 302  |
| Plastic Induration of the Penis                   | 303  |
| Priapism  | 305  |
| Dislocation, Strangulation, Fracture of the Penis | 306  |
| Carcinoma of the Penis                            | 307  |
| Sarcoma of the Penis                              | 308  |
| Tuberculosis of the Penis                         | 308  |

## CHAPTER VIII

|   |     |
|---|-----|
| <i>DISEASES OF THE URETHRA</i>                            | 310 |
| Urethral Malformations                                    | 310 |
| Gonorrhea   | 313 |
| The Complications of Acute Gonorrhea, and Their Treatment | 335 |
| Chronic Gonorrhea   | 341 |
| Nonspecific Urethritis                                    | 343 |
| Stricture of the Urethra                                  | 347 |
| Injuries to the Urethra                                   | 355 |
| Urethral Tuberculosis                                     | 357 |
| Urethral Diverticulum                                     | 358 |
| Urethral Tumor  | 361 |
| Urethral Polyp  | 363 |
| Urethral Papilloma  | 364 |
| Malignant Growths   | 365 |
| Chancre of the Urethra                                    | 366 |
| Congenital Valves   | 367 |

## CHAPTER IX

|   |     |
|---|-----|
| <i>DISEASES OF COWPER'S GLANDS, PROSTATE GLAND AND SEMINAL VESICLES</i> | 369 |
| Diseases of Cowper's Glands   | 369 |
| Diseases of the Prostate Gland  | 371 |
| Diseases of the Seminal Vesicles  | 404 |

## CHAPTER X

|   |     |
|---|-----|
| <i>DISEASES OF THE SCROTUM AND SCROTAL CONTENTS</i> | 407 |
| Diseases of the Scrotum                             | 407 |
| Diseases of the Scrotal Contents                    | 414 |

## CHAPTER XI

PAGE

|  |     |
|--|-----|
| DISEASES OF THE BLADDER AND URETER ..... | 443 |
| Diseases of the Bladder .....            | 443 |
| Diseases of the Ureter .....             | 466 |

## CHAPTER XII

|                              |     |
|------------------------------|-----|
| DISEASES OF THE KIDNEY ..... | 475 |
| Pyelonephritis ... ..        | 475 |
| Pyelitis . . . . .           | 482 |
| Hydronephrosis .....         | 486 |
| Pyonephrosis . . . . .       | 490 |
| Renal Tuberculosis . . . . . | 493 |
| Renal Carbuncle . . . . .    | 501 |
| Renal Stone .....            | 503 |
| Renal Neoplasm . . . . .     | 510 |
| Renal Injury . . . . .       | 515 |
| Movable Kidney . . . . .     | 518 |
| Polycystic Kidney .....      | 520 |
| Horseshoe Kidney .. . . .    | 522 |
| Cysts of the Kidney .....    | 524 |

## CHAPTER XIII

|   |     |
|---|-----|
| THE SEXUAL PROBLEM . . . . .                                  | 526 |
| General Discussion .....                                      | 526 |
| Endocrinology and Sexual Performance .....                    | 530 |
| Posterior Urethral Disease in Relation to Sexual Function ... | 532 |
| Prostatic Disease in Relation to Sexual Function .....        | 533 |
| Seminal Vesicular Disease in Relation to Sexual Function ...  | 534 |
| Sexual Continence ... ..                                      | 534 |
| Sexual Impotence . . . . .                                    | 536 |
| Premature Ejaculations .....                                  | 541 |
| Failure of Ejaculations .....                                 | 543 |
| Involuntary Seminal Emissions .....                           | 544 |
| Coitus Interruptus .....                                      | 547 |
| Coitus Prolongatus . . . . .                                  | 548 |
| Masturbation . . . . .  | 550 |
| Homosexuality .....   | 553 |

## SECTION ON CYSTOSCOPY

|                               |     |
|-------------------------------|-----|
| Cystoscopy .....              | 555 |
| Cystoscopic Procedures .....  | 577 |
| Roentgenography .....         | 646 |
| Ureteral Calculus .....       | 660 |
| Stricture of the Ureter ..... | 667 |
| Vesical Hyperemia .....       | 669 |
| Vesical Inflammation .....    | 669 |

|   | PAGE |
|---|------|
| Acute Cystitis                          | 673  |
| Subacute and Chronic Cystitis           | 675  |
| Habit Bladders                          | 676  |
| Vesical Trabeculation                   | 679  |
| Bladder Diverticulation                 | 681  |
| Tuberculous Cystitis                    | 683  |
| Vesical Calculus                        | 687  |
| Ureterocele                             | 692  |
| Atony of the Bladder                    | 693  |
| Frank Pseudomembranous Trigonitis       | 693  |
| Obscure Pseudomembranous Trigonitis     | 695  |
| Panmural Cystitis                       | 697  |
| Incrusted Cystitis                      | 701  |
| Cystitis Haemorrhagica                  | 705  |
| Cystitis Gonorrhoea                     | 706  |
| Syphilis of the Bladder                 | 707  |
| Allergic Cystitis                       | 708  |
| Cystitis Emphysematosa                  | 710  |
| Vesical Varix                           | 711  |
| Vesical Leukoplakia                     | 713  |
| Malakoplakia                            | 714  |
| Idiopathic Chronic Ulcer of the Bladder | 715  |
| Vesical Bilharziasis                    | 715  |
| Cystitis Cystica                        | 717  |
| Staphylococcic Cystitis                 | 718  |
| Vesical Endometrioma                    | 718  |
| Foreign Bodies in the Bladder           | 719  |

# OFFICE UROLOGY

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## INTRODUCTION

Not so many years ago, and well within the memory of some of us, there was a great to-do among our surgeons regarding the need for the special division of medicine that only then was beginning to be spoken of as Urology. They had looked with some disdain upon those who called themselves Genito urinary Specialists and viewed them as a group not to be taken too seriously. To these older gentlemen of the scalpel many of the new-born "Urologists" gradually became quite a source of annoyance in that they dared to suggest that there were some things they could do better than could the general surgeon. These latter were willing to let the rhinologist play with the small things about the nose, though they refused to admit his better skill at removing tonsils. They raised no great objection to the obstetrician so long as he clung closely to his knitting, though they abhorred his gynecologic leanings. But when it came to someone suggesting there were those who even dared to hint that it would be best to send their kidney and bladder cases to those of special skill in caring for such things, well, the fight was on. And, strange as it may seem, in these days of wars and threats of wars, when he who wins may lose far more than does he who is vanquished, this was a war that brought great good to mankind in an enormous and speedy development of a hitherto limping branch of science.

Perhaps no one in medicine is more entitled to be called a "rugged individualist" than is the surgeon. Compared with his common forcefulness most of the others of us well could follow Mary to school, or sit down and write nursery rhymes. From the beginning he has ruled a wide domain. He did not take kindly to border raids and, when a group of revolutionaries started sniping at the very center of his kingdom, it was "war to the teeth." The worst part of it for him was that some of these urologists also were rugged. The most determined of them banded together and would make no retreat. Some few talked a lot and fought a lot, while most of them realized that the real way to win was to develop the lusty infant so that everyone would know he was about whether they shouted or not. Within a few years they added so much to our knowledge of things urologic as to force respect from all clear thinking physicians. Beyond any doubt the specialty of urology had established its right to a place as a separate branch of medicine.

So rapid had been this journey from unpleasant obscurity to scientific respectability that there had developed a definite tendency to think lightly of that wide territory that had to be crossed before the heights were gained. For some reason or other, the higher men climb into the rarefied air of the operating-room the less attention do they pay to those countless smaller stones that have made their scientific edifice such a shining achievement. Seemingly, it is as though the first prostatectomy or nephrectomy proves

that the budding urologist, at last, has become a man and ever after he must put away all thoughts of the lesser things if he would keep his place among the masters. And, as he advances farther and farther into the realms of surgery, he has less and less time for consideration of what the little things mean to mankind. This is a life of drama in which it is but natural that the little ailments of humans, which do not bring them to the need for his super-special skill, fail to thrill him as they did when he began to climb. If he would hold his own, he must keep abreast of advancing science and we should not expect him to think much or talk much about things that do not lead to surgery. And, true to expectation, he frequently does not. If he has developed the skill of the most skillful of his brothers, he is an artist and has a right to the temperament of the artist. If he falls a trifle short of this he is likely to view himself as a very good one, particularly if financial success smiles upon him. Arrived at this seemingly exalted state, a territory to which all of the cream seems to rise, he becomes the cynosure and envy of all of those lesser souls whose journey upward seems so long and hard. Afflicted with the fault of every age, these lesser stars, "scorn to wait for the things worth having; they want high noon at the day's dim dawn." They long to cry in exultant tones, "Excelsior!", forgetting all the while that the word excelsior also means stuffing.

The building of a scientist is like the making of a pie. It matters not how good may be the under crust and how beautiful the meringue, it is a poor pie if the filling is not as it should be. And, if one carefully analyzes the making of the present-day urologist, he is more than likely to suspect that there is a tendency to skimp on the "filling" and pay undue attention to those things that make the superstructure such a seemingly satisfying place in which to live.

The result of this scheme of things is that, long before men have filled the mental pie with a host of things that should be there, they make the leap into those upper reaches where the smell of blood is in the air; where drama is the order of the day and the economic rewards are greater; where men are prone to look for high-sounding, super-scientific reasons for perfectly simple little things.

Unfortunately for such tendencies, human perversity brings to millions, small ailments that cry for small attentions, while it afflicts only the few with those things that should lead to that hushed arena where souls must go down into "the valley of the shadow of death," while those around them breathe and talk through white rags. Where one must shed his blood, untold hundreds of creatures just as worthy must hear, perhaps, a lighter burden until he whose mind can attune itself to these lesser ills of mankind plies his art or Nature herself brings escape. It is for such as these and for those who must care for them that the following pages are intended. In them will be considered those little things so easy to overlook and, yet, so enormously important to the peace and comfort of that horde of benighted wanderers who are prone to fare none too well among those so commonly given to dreams of the letting of blood.

Thus, with all glory to those who have advanced the art so far in the truly surgical branches, we must admit that there is a far wider and equally important field in the domain of what appropriately can be called Medical Urology.

This wide field is not alone the concern of the urologist. It is equally the concern of that far larger army of earnest practitioners into whose hands fall the major portion of those for whom the art has value. And it matters not to what heights urology may soar as a specialty, it will never gather into its fold even a fair proportion of that vast army that sees in its family physician its counselor, guide, friend and almost savior.

From the ranks of these many will aspire to be urologists though far more of those who choose this branch as a life work will come from those whose fancy has been caught in college or in a hospital service. Thus there will be as there always have been those who have had the broadening experiences of general practice and those whose haste to scale the heights has found no time or liking for the more prosaic walks of medicine. The former will find in the nonsurgical branches so much that relieves that they will give them as much attention as they later give to the strictly surgical aspects of urology. They will be men of broad vision who aim to scale the heights that mean so much to the few but will never lose sight of the fact that far more human beings who need no surgery will just as greatly need their care.

The latter will see only the heights that lie beyond while they quickly pass through the to them less attractive low country. Haste will be the order of the day and in that haste they will grow to see a urogenital tract around which a man has been draped. And they will never know their field of vision has been so narrowed. Their older, slower brothers will see a man who happens to have a urogenital tract.

Before those youthful savants will stand the Specialization Board with its strict demands that they must produce the records of 50 cases upon which they have operated before they can stand examination. And they will dream of the day when they have reached the operative half century mark and passed the examination when they grasp the much coveted certificate that informs all comers that they at last have reached the goal and are entitled to call themselves Specialists in Urology. And haste will continue to be the seeming order of the day until those who guide the destinies of urology see the light that is there to see and insist that these aspirants must be as well grounded in the fundamentals of the branch as their 50 operations are intended to prove they are in the surgical field. It would be far better for countless patients to divide the branch into Medical and Surgical Urology and make one prove fitness in the former before he begins his mad race for the surgical half century mark.

#### OFFICE ARRANGEMENT

The arrangement of an office to be used solely for urologic cases requires considerably more care than does that of an office where secrecy is not so often a matter of importance. Because of this it is a wise thing to give careful attention to sound proofing. Few things are more difficult than the obtaining of a full and truthful urologic history from a patient who has sat in a reception room and heard part or all of the previous patient's history. Thus if one would learn the most from his patients, he must overcome this shortcoming in his office construction. To do this it usually is necessary to give attention to the doors alone and there are several ways in which these can be sound proofed effectively at very little expense.

If one does not want to go to the expense of a door on each side of the floor frame, an arrangement that always is awkward, or an especially constructed sound-proof door, he may be able to deaden much of the sound by placing a heavy sliding drape on the office side of the door. A far better arrangement, however, is the placing of a panel of Prestwood or some similar material on each side of the door with a space of one-half inch between the door and the panels. It is seldom under these arrangements that one has to hang pictures or drapes on the walls to further break sound waves.

A great convenience to the urologist is an extra door through which patients can be dismissed rather than being compelled to pass through the reception room again. Not only does this save embarrassment for the patient but it makes it possible to receive physicians and others without making those in the reception room feel that there are others who are being unduly favored. Also, it gives the urologist himself more freedom of action. If one has many female patients, particularly if he is in a city of limited population, it is wise to have a separate reception room for them if possible.

So much of one's office work in urology has to do with local treatments of one sort or another in which the patient is required to sit or lie down for some time that it is almost impossible to care for any number of patients with one treatment room. Such an office limitation works great hardship on both the physician and patient. The former must waste much time talking unimportant things to his patient while he combats the human temptation to hurry their treatments. The latter must waste time just waiting for a chance to get treated. The physician tries out both body and patience with little work. The patient consults his watch before his visit to see if he can spare the time he must wait and, if in doubt, he fails to make the visit that often is highly important to him. Assuredly, we have passed the age when a full reception room is more impressive to a patient than is prompt service. Wherefore, if the physician would do best by both his patients and himself, he must have more than one room in which treatments can be given, particularly if he has any volume of work to do or aspires to have it.

Having had both large and small treatment rooms, the author much prefers the latter, and considers the ideal size of room wherein routine urologic office treatments are carried out to be eight by ten feet, or thereabouts. In such a room one reaches in a step what he needs, if he has things conveniently arranged. For cystoscopic work a larger space is needed, because so much of the room is taken up by the patient and the table.

Space can be conserved in small rooms by the use of some sort of folding table, for only a small percentage of treatments require that the patient be placed upon a table, unless one has a large number of female patients. For this purpose the author devised the table shown in figure 1. Unfortunately the manufacturers of this table were unprincipled enough to obtain a patent upon it despite the author's sworn protest to the U. S. Patent Office and to themselves.

In the accompanying illustrations will be seen the floor arrangement of the author's office as well as those of several of his fellow urologists.

Much thought has been given to the location of things in the author's office. Each room is so arranged as to be most convenient to a right-handed worker, which adds much to both speed and convenience. His routine urethral irrigations and injections are carried out by having the patient stand



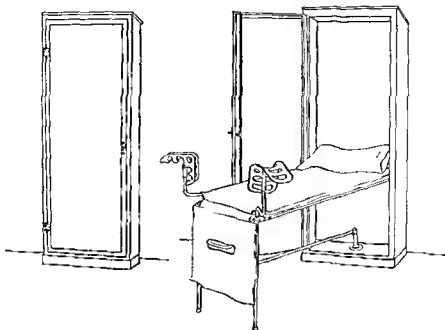


Fig 1.—Author's folding office table, closed and open.

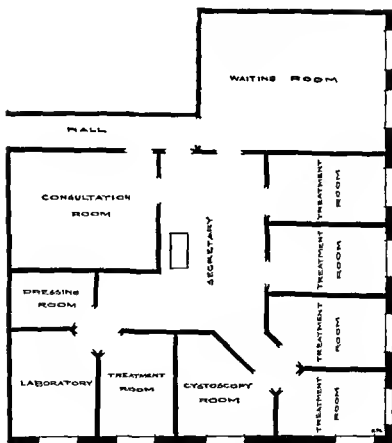


Fig. 2.—Floor plan of the author's office.

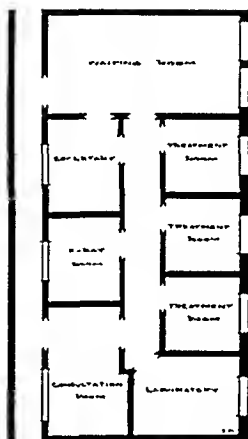


Fig. 3. Floor plan based on the author's recollection of Dr. Herman Kretschmer's office.

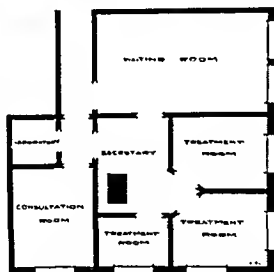


Fig. 4.—Convenient floor plan much like that of the writer's former office.

at a porcelain sink 28 inches high. Thus, it is arranged so that the patient has room to stand at the left end of the sink, while the physician, sitting in

front of it can reach the things he requires for such treatment which are on a small table at the right end of the sink without arising from the stool upon which he is seated. The author uses in such work the regular filing stool 16 inches high. This stool has 2 inch wheels which make it possible to reach things that may be further off without arising. Its mobility gives it an added advantage in that a slight push gets it out of the way without being lifted as is the case with the usual stools built for medical office work (see in Fig. 6)

A considerable number of urologic patients have what might be termed a bacteriophobia. Most of these are of the educated class who have read much about bacterial diseases and how they are transmitted. They have heard much of the accidental transferences of syphilis and gonorrhea and they suspect the infective potentialities of everything in the urologist's office. Such a feeling is fostered by the sight of soiled instruments lying around or by observation of untidiness or an appearance of uncleanness in rooms where treatments are carried out. It is allayed by such things as clean sinks

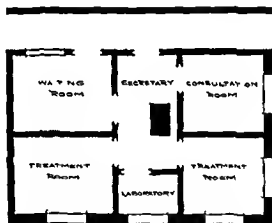


Fig. 5—Floor plan for smaller office

glassware, walls, tables, and a boiling sterilizer. Few are more observant of these things than is the careless physician who requires urethral treatments at the urologist's hands. Thus whatever the treatment room arrangements they should be planned so that they give the impression of perfect sparkling cleanliness. And it is a mistake to have used instruments lying where they can be seen by the patient. It is a simple matter to wash them and place them in the sterilizer immediately after use. Few realize how many of one's patients closely study the means he uses to prevent the transference of infection from other patients. They glory in seeing their instrument taken from a bubbling sterilizer.

While on the subject of patient psychology it might be well to call attention to a thing that makes for difficulty in carrying out certain types of treatment requiring relaxation. Among the author's treatment rooms was one containing the usual glass-sided instrument case showing an assortment of urethral sounds and like disquieting things. Many patients become panicky in a urologist's office at the sight of such things so much so in fact that they find it practically impossible to relax the cut-off muscle so that one

can carry out a hydrostatic irrigation of the bladder. It was interesting to see them try to avoid this room for one in which no instruments were to be seen. So much difficulty was occasioned that the glass cabinet was discarded and a metal-sided cabinet substituted for it. Surely a urologic treatment room used as a showroom for instruments is a mistake; it frightens the patient and wastes much time for the physician.

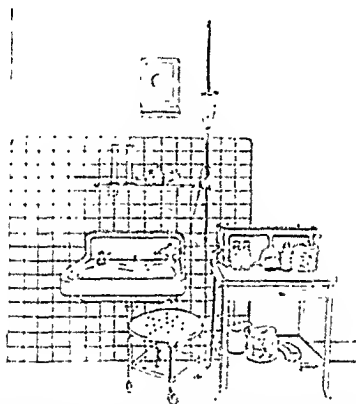


Fig. 6.—Treatment corner in author's room. Note the low sink with white tile background and the filing stool. On the shelf below the wall cabinet for paper towels are 2 urine beakers, a jar of lubricant, a bottle of permanganate of potash tablets, a bottle of dilute acetic acid and a glass jar containing a rubber finger-cot with cape immersed in 1:500 bichloride of mercury solution. On the table in front of the electric sterilizer are solution bottles with rubber ejector urethral syringes, a jar of lubricant for instruments, a jar of No. 10 rubber bands, a bottle of alcohol and a jar of cotton pledgets. On the table shelf are a pitcher, a large jar of 2 x 6-inch strips of cotton and a pus basin.

In choosing the plumbing for such an office it is well to recognize the fact that, though enameled, iron sinks are far cheaper at the beginning, they are far inferior to porcelain sinks. Just as soon as the glaze is gone from the surface of the iron sink it becomes stained in such a way as to be a decidedly unsightly piece of office furniture. No matter how well it is cared for, it soon gets so that it absorbs and holds stains of various kinds. On the other hand, a good porcelain sink, properly cared for, will look far better at the end of ten years than will the other at the end of one year.

Thought should be given also to the wall back of the sink, for, no matter

how skillful the worker may be, it is sure to gather an assortment of different colored stains that take much from the appearance of an office. After trying out a number of ideas to overcome this the author had porcelain tiling placed back of each sink, as will be seen in figure 6. This makes it possible to keep spotless what usually is the most unsightly part of a urologic office.

So far as the floor is concerned, nothing approaches an inlaid linoleum providing it contains little, if any, white. Red, black and light- or dark-brown blocks are far better than other colors. None of the articles used in a urologic office, except silver nitrate make a permanent stain on them, and even the stains of silver are easily removed by applying tincture of iodine until the stain turns yellow and then some dilute ammonia to remove the yellow.

Attention to the little details that make for cleanliness is far more important than many of us think. That all urologists are not aware to this factor and to the adverse impression made by its neglect, is shown by the number of patients who have described some offices to the author. These urologists are quick enough to see and to criticize a poorly cared for operating room and want it to be otherwise if they are to operate in it. Yet, patients whom the author has referred to some of their offices have returned with the query, "Were you ever in his office?" This frequently is followed by a description of silver stains or others, a dirty sterilizer or none in sight, dirty glassware and the like. Many even have said, "It's good to get back where things are clean and you don't shiver when you come in contact with them." Assuredly, public enlightenment has gone far beyond the old day when "anything went," and we must plan our offices accordingly.

In the urologic office the location of a secretary's desk always brings up some interesting problems that have to do mostly with patient psychology. In settling this question one must take into consideration the type of his practice, his secretary, and the work he is to expect of her. Some urologists prefer a male secretary with the thought that it removes much that is unpleasant from the path of the male patients and, if he is of the proper sort, he can be of much help with male patients. This has very definite and obvious advantages. Its two great disadvantages rest in the fact that such a secretary is useless with female patients where one needs more help and in normal times the type of man one would want for this work has too much ambition to be just a doctor's secretary.

The female secretary experiences no such feelings and, if properly chosen, is a far more helpful individual in a large city. In a small community where much of the work is of a "venereal" sort, she may, however, be a practice killing menace. Above all things she should be a woman of sufficient breadth of intellect to separate the questions of disease and morals and have too much sense and tact to embarrass. Such a secretary does much to overcome the patient's feeling that the urologist's office is a shameful place to be. If her desk is in the reception room she will get little clerical work done during office hours unless she be of a type too forbidding for idle conversation. If possible she should be in a room by herself but one from which she can see patients as they come and go. If there is a foyer to the suite it is best to put her there, for unobtrusively she can keep in closer touch with the practice, be of greater help to the physician and will add much to the economic outlook.

## EQUIPMENT

The equipment needed for urologic work naturally varies with the extent to which one covers the fields of diagnosis and treatment. There are certain things that he must have in order to carry out the simpler diagnostic and treatment procedures and others that must be had if he intends to carry out urethroscopy and cystoscopy, together with the things that they make possible. As the armamentaria for these latter procedures belong more especially to what one might call advanced urology, it probably would be best to consider them under the headings of urethroscopy and cystoscopy and confine ourselves here to those things essential for the performance of the other urologic procedures and to those things of a useful but not necessarily essential character.

**Microscope and Accessories.**—The one thing about which much of the work in urology rotates is the microscope, and good urology cannot be done without it. There is no necessity, however, to have one of the higher-priced microscopes with every possible adjustment and attachment. The regular clinical microscope, as made by our American manufacturers, answers every purpose and is simple to use. The microscope for urologic work should have several eye-pieces for different magnifications and a triple nose-piece carrying a 16-mm. (2/3-inch), a 4-mm. (1/6-inch) and a 2-mm. (1/12-inch)

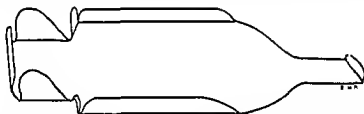


Fig. 7.—Aluminum tray made from a ten-cent pie plate to hold the microscope base and Spencer lamp in constant relation with one another.

homogeneous oil-immersion lens. The addition of a mechanical stage is of the greatest convenience.

There are a number of very good microscope lamps on the market. The author has found the Spencer micro-lamp most convenient. By removing the microscope mirror this can be placed directly under the Abbé condenser. To prevent the nuisance of repeatedly moving the lamp every time the microscope makes the slightest shift, the writer has made from a sheet of aluminum (a pie plate from the ten-cent store) an apparatus that makes this unnecessary, since the microscope and lamp are held in fixed relation to each other (Fig. 7).

For the carrying out of dark-field studies a dark-field condenser is essential and, as more intense light is needed, a dark-field lamp should be had. The type of lamp shown in figure 8 is low in price and will be found perfectly satisfactory. There are, however, on the market dark-field condensers having an illuminating lamp, which are much simpler to handle.

**Stains and Solutions.**—In urologic work, as is said elsewhere, plain methylene blue staining of urethral discharges and the like is a most fertile source of erroneous interpretation. For this reason, one does best if he stains every specimen by the Gram method of staining. The original Gram

technic has undergone many modifications. The writer has tried many of these modifications and has found the following one the simplest to use and the most uniformly reliable

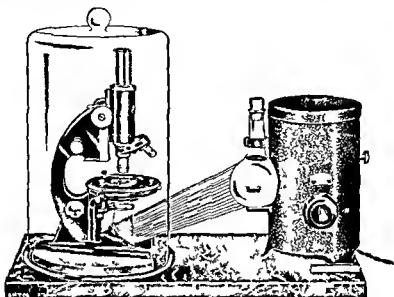


Fig 8 Dark field assembly

- 1 Crystal violet 1 per cent aqueous solution
- 2 Iodine solution Made by dissolving iodine 2 grams in 10 c c normal NaOH and then adding 90 c c of distilled water
- 3 Acetone
- 4 Basic fuchsin 0.1 per cent aqueous solution

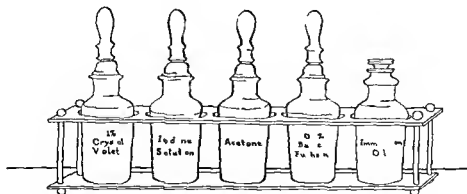


Fig 9—Bottle rack and set up for Gram stain

The technic for the use of these stains is described elsewhere (p 102). For the staining of tubercle bacilli the following solutions are needed

- 1 Ziehl Neelsen carbolfuchsin made by adding 10 c c of saturated alcoholic solution of basic fuchsin to 100 c c of 5 per cent solution of carbolic acid

2. Acid alcohol, 3 per cent. of hydrochloric acid in 95 per cent. alcohol.

3. Löffler's methylene blue, made by the addition of 30 c.c. of saturated alcoholic solution of methylene blue to 100 c.c. of 1:10,000 solution of potassium hydroxide.

In addition to these one should have the following:

1. Platinum or nickel alloy loop.
2. Coverslips.
3. Glass slides.
4. Lens paper.
5. Pipettes.
6. Immersion oil.
7. Xylene, for removing oil from slides to be kept and perhaps from the oil immersion lens. (When used for the latter purpose it should be wiped from the lens immediately to avoid influencing the lens seating.)
8. Bunsen burner or alcohol lamp.
9. Centrifuge.
10. Centrifuge tubes.
11. Wash bottle.
12. Wash dish.
13. Test tubes.

**Instruments.**—It is far better for one to choose those urologic instruments that are of greatest utility and to add to them from time to time, than to acquire everything that seemingly could be useful. The more one respects the traumatizing possibilities of urethral instruments the less he will use them and the fewer he will think he needs. There are, however, a number of absolutely essential instruments and an effort will be made to enumerate them and to give their uses.

**Urethral Sounds.**—In choosing sounds several things should be kept in mind. In the first place, there is no economy in nickel-plated sounds, though their initial cost be less. Repeated handling and boiling chips the nickel, causes rough rust spots and makes them unsuited for use until renickelled. It is far better to choose rust-proof sounds. One does not need consecutively numbered sounds, as he can do equally well with alternate sizes. It is well to measure the size of each sound as selected, inasmuch as great reliance cannot be placed on the numbers stamped upon them by the manufacturers. The most comfortable sound for the patient is the one with the double taper, though the single-taper, Thompson quarter-curve sound is just as useful and less expensive. Sounds should be picked out that have a good taper at the tip, as broad-tipped sounds not only are hard to use in strictured areas, but are more painful to pass and more dangerous.

Unless one is exceptionally skillful in the passage of urethral instruments, the tips of sounds below 20 F. are so small in diameter as to be decidedly dangerous to the patient and excellent instruments for the making of false passages in the urethra. Because of this, it has grown to be common custom among careful urologists to use bougies where smaller caliber instruments are needed. Certainly these latter are far less likely to do urethral harm.

**Bougies.**—The woven bougie is used more safely for the dilatation of urethral narrowings below 20 in the French scale. The best ones are made abroad, and those containing small shot as a core are more easily handled and of far greater durability. It is well to have alternate sizes of from 8 to



20 F and, perhaps, several larger than 20 F, since a few patients find these instruments much more comfortable than the solid sound

The bougie à boule is perhaps a safer instrument than the bulbar sound of the same shape. They are not so durable, however, and, if one is gentle in his manipulations, the solid instrument has definite advantages

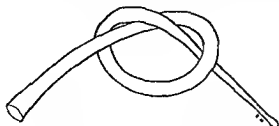


Fig 10—The woven olive tipped bougie

These instruments are used for the diagnosis of urethral strictures or granulations. The longer taper of the tip makes it possible to pass them through the narrowing and, upon being withdrawn they give a definite hang at the coarctation. In the presence of narrowings associated with granulations a small smear of blood frequently is seen on the shoulder of the

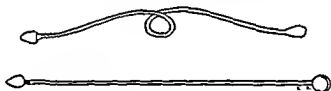


Fig 11—The acorn bougie and sound

bulb. These also are good instruments to use in tests of cure of gonorrheal infection of the anterior urethra. They are useless for posterior urethral work. Alternate sizes from 8 to 26 F are most useful.

**Urethral Dilators**—The mechanical dilators for urethral work most commonly in use are those of the Kollmann pattern. These instruments have

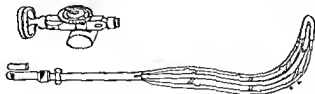


Fig 12—The Kollmann dilator with a Guyon curve

their uses but are not without danger to the patient. One has only to have something snap while the instrument is in the urethra to cause him to view it as rather a good office souvenir. It is said that the modern instrument with the rounded blades does not require the use of a rubber cover. One who has examined the vesical outlets of many patients upon whom this reputedly safe pattern has been used will not be impressed greatly by its

safety for the patient. The presence of tabs of mucous membrane that have been pinched between the blades is so common in these individuals as to suggest that their safety would be enhanced by the use of a rubber cover, as was urged for the older type.

For the dilatation of urethral stricture they carry a great hazard for the patient. They obscure one's finer tactile sense that is so necessary in urethral instrumentation, and strictures are as likely to be split as stretched by them.

**Filiforms.**—There are two types of filiforms, the whalebone and the woven. Whalebone filiforms are used to pass through very tight strictures, usually as guides for that instrument with marked traumatizing possibilities,



Fig. 13.—Gouley tunneled catheter containing whalebone filiform.

namely, the Gouley tunneled catheter. At times, they are used without the metal instrument, being tied in for the purpose of continuous dilatation. They are often of the greatest value, for they will enter strictures that are not passable to other filiforms.

**Filiforms with Followers.**—The woven filiform usually has a metal female thread fastened in its larger end so that either the Philips catheter or bougie or the LeFort sound may be attached to it. It is generally a much more useful filiform than the whalebone one, as the point of junction between it and its attached follower is much smoother than is that between the whalebone filiform and the Gouley instrument. For this reason, it can-

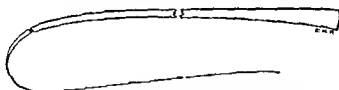


Fig. 14.—The Philips filiform and catheter.

not bruise the face of the stricture, as can the Gouley. Filiform tips frequently are curved, angulated or spiral in direction. This, at times, aids in locating the opening through a strictured area, particularly in the presence of tortuous strictures.

**Gouley Tunneled Catheter and Sound.**—These instruments come in various sizes and, upon rare occasions, are of the greatest utility, though the writer has not used his for years. They have been largely replaced by the Philips or LeFort instruments. The Gouley instruments require great care for their use. Their tendency to fold or cut the guiding whalebone filiform is a real hazard and many badly damaged urethras have resulted from this accident. Surely they are no instrument for the novice.

**Philips Catheter and Bougie**—This catheter, with its woven filiform guide, as has been said, has largely relegated the Gouley catheter to the shelf for souvenirs. They have a male thread fastened to the tip which makes a smooth joint with the female thread of the woven filiform. They also come in one piece but are so long as to be unwieldy. The separate filiforms and catheters are much easier to use. One can get along as well with catheters as with bougies. It is well to have sizes 12, 14, 16 and 18 French. For, when the latter size is reached, a stricture generally will take the tip of a 20 F sound or bougie.

**LeFort Sound and Catheter**—This sound serves the same purpose as the Philips instrument. There are on the market solid and hollow types. Both are very useful instruments but, because of the manner in which the junction is made with the filiform, they must be passed into the vesical outlet with care if trauma is to be avoided. Instead of the real Thompson curve the more rigid portion of the filiform of many LeFort instruments continues for  $\frac{1}{2}$  inch in a straight line perpendicular to the shaft of the instrument. If too quickly depressed to straighten out the urethral curves, this extension catches the anterior vesical rim and often bends the filiform to the point of breaking its outer coating. The instruments also are made without this elongation of the tip by some manufacturers and one should be careful to



Fig. 15—LeFort sound and filiform

select such a pattern. The most useful sizes are, as with the Philips, 12, 14, 16 and 18 French.

**Urethral Catheters**—There are three different types of urethral catheters in general use, metal, woven silk, and soft rubber, and each type has its advantages and disadvantages. In all of them one finds a large assortment of different curves and tips devised to give special advantage in the different urologic conditions. It would be needless to describe all, for which reason only those possessing distinct advantages will be mentioned. To this end brevity will be served by a preliminary discussion of the advantages of the various curves and tips. The general differences in the uses of the catheters of different compositions is that the metal catheters and the woven silk catheters should be used only for intermittent catheterization, whereas the soft rubber catheter has the added value of serving as an indwelling catheter for continuous catheterization. Woven catheters have their coatings so quickly roughened by urethral secretions that they should not be left for any length of time in the urethra. The metal catheter can be guided, whereas the passage of the others is more of a blind procedure.

**The Double Elbowed Catheter (*Bi coude*)**—Catheters of this shape usually are of the woven silk type and are intended for use in prostatic hyperphly. Because of their shape, they tend to rise over median prostatic lobe

obstructions and ordinarily are much easier to use than the over-curved metal catheter. Even in the absence of hypertrophy they are easier to pass in some individuals than are other types, and it is well to have several sizes of them in one's armamentarium. Sizes 15, 18, and 22 are most useful.

*The Single Elbow Catheter (Coudé).*—The single elbow or coudé catheter is the most useful of all catheters for general use. It is so shaped that the tip follows the roof of the urethra and has less tendency to hang at either

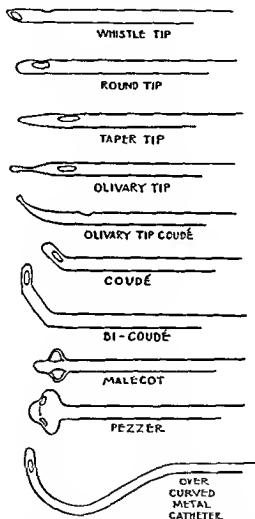


Fig. 16.—Rubber and woven catheters.

the bulbomembranous junction or the vesical outlet. Because of its slight rigidity, the woven type is best for bladder emptying in gentle hands. Roughly used it is not without traumatizing possibilities. Soft rubber coudé catheters are very useful also and make good catheters for prolonged catheterization by virtue of the tendency of the tip to ride up off the sensitive trigone.

*The Straight Catheter.*—The straight woven catheter is a dangerous instrument and is seldom used in urologic practice. On the other hand, the

straight, soft rubber catheter is very generally used. Its great flexibility makes it a very easy instrument to introduce and it is almost impossible to traumatize the urethra with it. It lends itself to a variety of uses and is so devoid of harmful possibilities that it is the instrument of choice in cases where it is necessary to trust the patient to catheterize himself. Its flexibility makes it need more handling than do the more rigid catheters but this readily may be avoided by using thumb forceps for its introduction.

*The Pezzar Catheter*—This catheter used to be employed widely as an indwelling catheter in the female or through suprapubic cystostomies. The danger of the end pulling off upon efforts at removal has caused it largely to be abandoned for the far safer Malecot catheter. Both catheters have to be introduced with a mandrin.



Fig 17—Flexible mandrin at times used for the introduction of the rubber urethral catheter. It can be bent into any shape.

*The Malecot Catheter*—This catheter, as has been said, largely has replaced the older Pezzar catheter. It is far safer from the standpoint that the tip is not so readily torn off by efforts at removal.

*The Catheter Mandrin*—The wire mandrin or obturator is occasionally needed for the introduction of a soft rubber catheter into the bladder. The instrument is made of soft metal and can be bent into any shape.

*The Multiple eyed Catheter*—This catheter is a very useful catheter where it is necessary to suck blood clot from the bladder. Its multiple openings make possible the use of much suction without mucous membrane injury. One can easily make an equally serviceable catheter for this purpose by

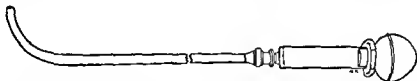


Fig 18—The Bangs instilling cannula with a rubber bulb ejector syringe for the introduction of fluids into the posterior urethra and bladder.

punching several holes through a large soft rubber catheter with a belt punch. The same can be done less cleanly by use of a hot wire.

*The Catheter Tip*—The most commonly used tip is the round one, though the olivary tip has gained much favor. The flute tipped catheter is preferred by many for continuous catheterization. For use with a mandrin the round, hollow-tipped catheter must be used.

*Syringes*—*The Keyes Ultzmann Syringe*—The Keyes-Ultzmann syringe was devised for the purpose of injecting fluids into the posterior urethra without having the substances touch the anterior urethral mucous membrane. The older type urethral tube is small in caliber and usually has a tip capable of doing great damage to the mucous membrane, particularly at the bulbomembranous junction. Because of this, it is the prevailing custom to use a cannula of larger caliber (Bangs), the tip of which does less urethral damage.

The modern instruments usually are arranged to fit the tip of a Luer syringe, so that either a glass piston syringe or one with a rubber bulb ejector can be used.

*The Suction Syringe.*—The suction syringe is used mainly for the removal of blood clot from the bladder. It has a piston covered with asbestos and a tip that fits the flare of the catheter.

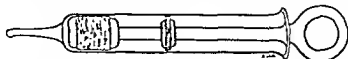


Fig. 19.—Suction syringe with asbestos-wrapped piston and catheter tip.

The usual type of metal bladder syringe may be used for the same purpose, but its more complicated design does not give it the convenience of the glass syringe for the purpose.

*The Urethral Syringe.*—The old-fashioned rubber piston syringe has given way to the far safer and simpler syringe with a rubber bulb ejector. These syringes are used mainly for hand injections into the anterior urethra. They can, however, be used for the gentle injection of fluids into the

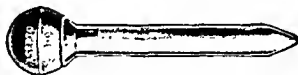


Fig. 20.—The safest type of syringe for urethral injections.

posterior portion of the canal and bladder. By having the patient relax his sphincters as though in the act of urination this latter can be done without the use of force.

The nozzle should be blunt and care should be taken to see that it is smooth and not chipped in any way. One should have several such syringes. They come in a number of sizes.

*The Catheter Syringe.*—The catheter syringe differs from the urethral syringe in that it has a tapering tip that fits inside the flare of the catheter.

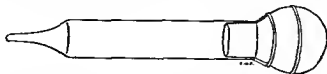


Fig. 21.—Glass syringe with rubber bulb ejector and catheter tip.

These syringes come in many sizes and largely have supplanted the older types of bladder syringes except for the purpose of suction.

*Massage Finger Cot.*—The finger cot with a rubber cape is much more convenient than the old type of finger cot, or than the rubber glove. It has the advantage of being easily slipped on the finger, is readily removed and the cape protects the physician's hand well. These finger cots also are made with two fingers for vaginal examinations. They can be washed after use

by folding the cape forward before removal so that it comes between the used finger and those of the washing hand (see Fig. 145)

**Wolbarst Basin**—The Wolbarst basin is a very convenient affair to use for the recumbent patient. It covers the inside of the thighs from the action of staining solutions.

**Colorimeters**—It is rather a simple matter to make one's own colorimeter for the phthalein percentage determinations by placing different percentages

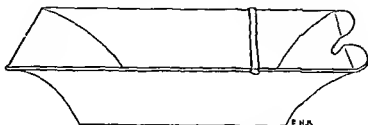


Fig. 22—Outline of the Wolbarst basin

of phthalein solution in test tubes of the same size and sealing them. Still, most urologists use one of the several good ones on the market. The simplest and cheapest of these is the Dunning, which can be used for months without perceptible fading of the solutions. They can be renewed at little cost. Of the other types in common use might be mentioned the Hellige, Dubosq and the newer one devised by Young and Elvers.



Fig. 23—The Dunning colorimeter for phenolsulphonephthalein determinations (Courtesy of Hynson Westcott and Dunning)

**Hydrogen ion Comparators**—Prior to the introduction by Parke, Davis and Company of their nitrazine scale for hydrogen ion determinations it was necessary to use the more complicated comparators, such as the La Motte or the electric potentiometer. This far simpler method serves for office purposes as well, if perhaps not so accurately, as the more expensive methods of comparison. For the more accurate needs of scientific investigation the others are to be preferred.

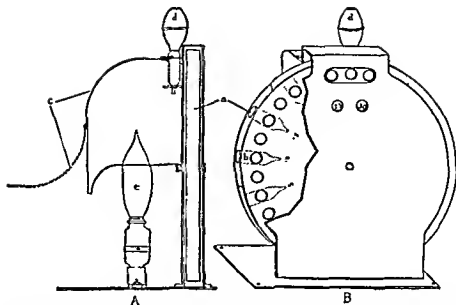


Fig. 24.—Phthaleinometer devised by Young and Elvers. *A*, Side view with window at *c* for daylight readings and lamp at *c* for artificial light. The ampule containing the solution to be tested is at *d*. *B*, Sectional view of wheel in which are placed the ampules containing the color standards. (Courtesy of Young and Elvers.)

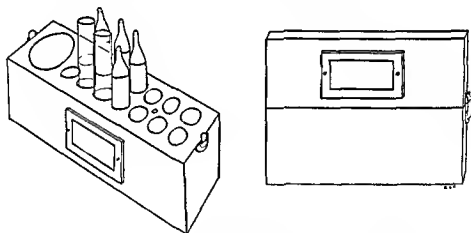


Fig. 25.—The La Motte hydrogen-ion comparator in use and closed.

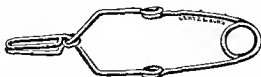


Fig. 26.—Author's penis clamp.

**Penis Clamp.**—For the retaining of fluids in the anterior urethra the author's clamp is a simple one and serves the purpose well. It is best used by placing cotton over the meatus and along the penis so that it is interposed



between the penis and the blades of the instrument. The Hyams clamp is simple, extremely easy to handle and requires no intervening cotton.

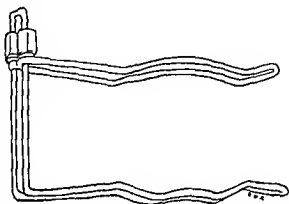


Fig 27—Simple and decidedly efficient penis clamp devised by Hyams

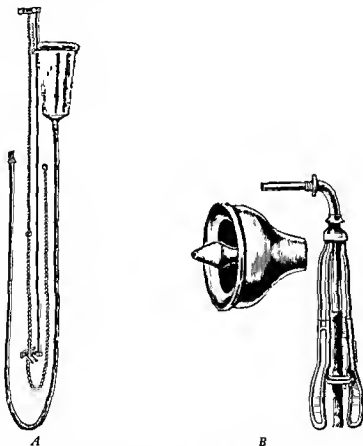


Fig 28—A, The safest and most convenient type of apparatus for urethral and intravesical hydrostatic irrigations. B, Eaton urethral irrigating cut off with the author's nonsplash nozzle

**Irrigating Tank.**—Perhaps the most useful type of irrigating apparatus for routine office work is that shown in figure 28. It may be fitted with

either a one- or two-quart jar and lends itself well to inclosure in some type of wall cabinet if deemed unsightly.



Fig. 29.—Convenient type of office treatment bottle. (Courtesy of Becton-Dickinson Co.)

**Irrigating Nozzle.**—The author's nonsplash nozzle on an Eaton cut-off makes an excellent instrument for the giving of urethral irrigations. With it the side-splash of the regular irrigator nozzle bell is entirely avoided. It is

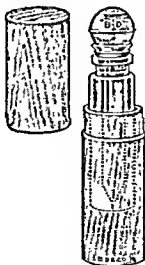


Fig. 30.—A convenient outfit for the patient's use.

smaller and less cumbersome than the older Valentine nozzle and consequently occasions less apprehension on the part of the patient.

**Injection Bottles.**—For use in the giving of urethral injections in the

office nothing is quite so convenient and cleanly as the Asepto outfit illustrated in figure 29

**Patient Injection Outfits**—These outfits are excellent for patient use and come in two sizes. The smaller size ( $\frac{1}{8}$  ounce) holds enough for several days' use and readily can be carried in the pocket. The syringe holds enough for anterior injection only.

**Other Instruments**—Aside from the above and the usual small things such as basins, scissors, syringes, forceps, specula and the like found in every physician's office, the following are needed for urologic office work:

- Urethral forceps
- 1000 c c graduate
- Urine cylinders
- Cautery of some type

Rheostat or batteries for illumination of cystoscopes and endoscopes, described in the section on Cystoscopy

### THE STERILIZATION OF INSTRUMENTS

Mistakes made in the methods of sterilization of the various instruments used in urologic office work, at times are quite expensive. Perhaps the

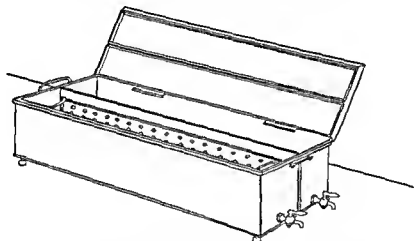


Fig. 31—The Randall Moorhead immersion sterilizer. Ten per cent formalin solution is placed in the back tank and a rinsing solution is in the front one.

greatest misfortune of this type is the placing of cystoscopes and like instruments in boiling water. This usually is a nurse's blunder, but the leaving of woven catheters in the sterilizer too long is more often the doctor's blunder and it occurs often enough in the average office to add materially to office upkeep.

The most convenient type of office sterilizer is the 13 inch electric one, because it is long enough for any of the urologic instruments used, gives little radiated heat and causes less trouble. A gas sterilizer although perhaps less expensive to run is more trouble and seldom can be kept looking so clean as can the former.

For immersion sterilization the Randall Moorhead sterilizer is very convenient (Fig. 31). It contains two chambers, one for the sterilizing and the other for the rinsing solution. Its only objection is that, if one uses formalin

solution, the rinsing solution seems to absorb enough of it in a short time to make it rather irritating to the urethral mucous membrane. If the rinsing solution is changed daily, however, this is not a factor. Though he has one of these sterilizers, the writer really uses two of the old type obstetric forceps sterilizers (Fig. 32). If obtained with a chromium plating, they are slightly and easily kept so, and there is no chance of getting more formalin in the rinsing chamber than is carried over by the instruments and the tray. By allowing these to drain for a moment this amount is not large. In the sterilizer marked "F" is kept formalin solution from a stock bottle of one gallon of water and one pound of formalin. In the other is kept a rinsing solution made by adding six drams of full strength carbolic acid to a gallon of water.

Immersion sterilization with formalin is very prompt, so that instruments for which such sterilization is essential may be used at frequent intervals. If rinsed in the dilute carbolic solution they need no further washing but may be used immediately. Carbolic of this strength has no discernible influence, either chemical or sensory, upon the mucous membrane.

Sterilization by formalin gas is efficient but, to be safe, must be prolonged. Half-hour sterilization in small chambers has been shown efficient, but the

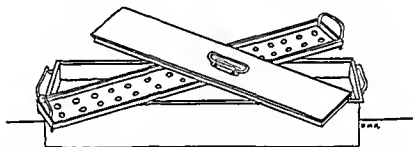


Fig. 32.—Chromium-plated obstetric forceps sterilizer. The author uses two of these for the sterilization and rinsing of his cystoscopes and likes them better than the more expensive Randall-Moorhead sterilizer.

demands of office work rarely permit of such delays. The instrument cabinets equipped for formalin sterilization are of distinct value in dispensary practice but they require many hours for safe sterilization of their contents. To use them one must have great duplication of instruments which, when it has to do with cystoscopes and their armamentaria, is prohibitive for all but highly endowed institutions. Even in those one is struck by the evidences of pathetic waste of funds to build up an assortment of cystoscopes and duplications thereof which, to say the least, are a needless parading of wealth. This in face of the fact that immersion sterilization is safer and allows of repeated use of the same cystoscope.

Of the smaller formalin gas sterilizers, the Snell sterilizer is the most complete. It makes possible the sterilization of the interior of urethral catheters by forcing the formalin gas through them. The writer has used one and has seen others use them, but does not recall seeing the catheters fastened to the sterilization jets very often, so that this feature of the sterilizer is attractive in theory, but is seldom put into practice.

As urethral catheters and other catheters of like composition can be sterilized by boiling for short periods or by immersion in formalin solution, pro-

viding the former have the solution sucked into their lumen by a syringe there is little necessity for so time consuming a method of sterilization in office practice as formalin gas. This method of sterilization finds its greatest use in the small catheter containers designed mostly for house practice. By their use it is possible to have sterile dry catheters for use at any time.

To some, formalin solutions are objectionable because of eyes or nasal mucous membranes too sensitive for them or because of their action on the hands. Both objections usually may be overcome with little difficulty. To avoid the former, the lid may be kept on the formalin sterilizer except when putting the instruments in or taking them out, to avoid the latter, the instruments may be handled with instrument forceps, if a transferring tray is not included with the sterilizing tank, or rubber gloves may be used. On the other hand one may use perhaps less efficient solutions such as 1:5000 bismuthide of mercury or 5 per cent carbolic acid solution or stronger.

All metal instruments except cystoscopes may be sterilized by boiling and, if one is wise enough to buy only rust-proof instruments no harm is done if they are left in the sterilizer indefinitely.

Rubber catheters may be boiled but prolonged boiling tends to soften them so that they are more difficult to pass. Boiling rubber catheters at least once a month prolongs their period of usefulness.

Woven catheters may be boiled for a short time, but upon prolonged boiling their coating frequently becomes too rough for further use. They will stand immersion in antiseptic solutions for considerable time without injury.

Woven filiforms and catheters, such as the Philips catheter, and the filiforms for them and for the LeFort sound, should be sterilized by immersion in antiseptic solutions. Boiling has a tendency to loosen the metal thread that is fastened in their ends. Also it makes them very soft. If curved from use they can be straightened by a moment's immersion in boiling water.

Glass syringes may be sterilized by almost any method. With glass piston syringes one should separate barrel and piston before boiling and where there are any rubber parts, boiling should not be too prolonged.

#### CARE OF THE HANDS

In urologic office treatment rubber gloves are a nuisance. There are so many things to do other than the direct handling of instruments as to make them a great annoyance. Whereas they should be used for the handling of active ulcerations, they are needless for other work. The free use of soap and water before and after handling patients is all that is necessary and it does not give the patient the idea that he or the things around him are too unclean. If one forms a fixed habit of not touching with his hands any part of the instrument that goes into the patient's urethra or bladder he will subject him to no danger from manual infection. To do this with rigid instruments is a matter of the utmost ease and flexible instruments may be handled with thumb forceps or sterile pledgets of cotton.

The one reason why physicians hesitate to touch gonorrheal patients is the fear of manually transmitting the infection to others. This is one of the most groundless of fears, for washing the hands with soap and water is sufficient to remove any gonococci that may have gotten on them. Soap solutions make such a marked change in the surface tension of gonococci as to disintegrate them almost immediately.

## CHAPTER I

### ANATOMIC STRUCTURE AND PHYSIOLOGIC FUNCTION

HE who tried to solve the many diagnostic and therapeutic problems presented by deviations from the normal in the urogenital tract without a thorough knowledge of its structure and function, would find himself seriously handicapped. He perhaps would not require so great a familiarity with structure as would one who attempted surgery, but, of a certainty, he would need to know those things of anatomy which, often, are determining factors in the type and location of the various pathologic lesions encountered. In other words, a knowledge of what well might be called the applied anatomy of the urogenital tract would be indispensable. So far as the matter of physiology, or function, is concerned, he would have need for a closer familiarity, so that he could more readily draw the dividing line between the symptoms due to disease and those due to psychologic interference with the normal functioning of certain parts of the urogenital system.

Thus, in this section an endeavor will be made to supply only that part of anatomy which is absolutely essential to an understanding of the pages to follow and such points upon function as are fundamental. In many places throughout the book it will be necessary to add to this seemingly meager account of the normal behavior of the various portions of the tract. Particularly is this true of the bladder and the sexual functions, wherein mental processes more often produce, at least, symptomatic departures from the normal.

### THE KIDNEY

**Anatomy.**—The kidneys, when normally placed, rest in the renal fossae with their upper extremities about on the level of the upper border of the twelfth dorsal vertebra. Their lower extremities are usually at about the middle of the body of the third lumbar vertebra. The right kidney lies from 1 to 2 cm. lower than the left: they do not occupy an exactly perpendicular position, as their lower poles lie farther apart than do their upper poles.

The *hilus* of each organ is placed on the side nearest the spinal column with its upper border usually about opposite the upper border of the body of the second lumbar vertebra. There is, however, so much variation in the types of renal pelves in different individuals that this portion of the organ shows wide variations as to location.

The *body* of the kidney in youth and adult life is surrounded by a layer of fat, the *perirenal fat*, which varies in thickness in different individuals. This, in turn, is enveloped by the *perirenal fasciae*. These layers of fascia, the *prerenal* and *postrenal*, form a moderately dense enveloping sheath. At their upper and outer borders they join quite firmly but the same is not true of their lower aspects, and it is to the latter that we may attribute the abnormally *mobile kidneys* so commonly encountered. Mesially these two fibrous sheaths join quite intimately with the tissues surrounding the aorta

and the vena cava. This junction apparently is sufficiently complete to prevent free communication between the two renal fossae for perinephric abscesses though they fill the perirenal space to the point of great tension do not pass to the opposite side.

From such a supporting arrangement it will be seen that the kidney is not in any sense a firmly attached organ. Indeed it normally enjoys quite a little mobility rising and falling particularly on the right side from one to several centimeters during respiration. The thinner its layer of surrounding fat the greater is its mobility under normal conditions.

On its interior surface the kidney is in rather close apposition with highly important intra abdominal structures from which it is separated mostly by the prerenal fat and fascia. Anterior to the right kidney lie the liver duo-

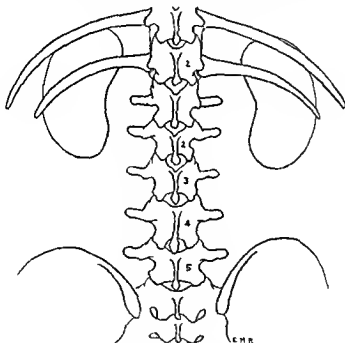


Fig. 33 The position of the kidneys as relation to the ribs

denum and ascending colon. On the anterior aspect of the left kidney are the stomach, tail of the pancreas, spleen, jejunum and the splenic flexure of the colon. The superior poles of both kidneys are capped by the suprarenal glands.

The close proximity of these contiguous organs to the kidney while more often of surgical importance at times is the determining factor in renal pathology. And the immediate location of the peritoneal cavity presents perhaps a greater hazard in the other direction.

The normal position of the kidney is dependent upon its proper rising from the pelvis and rotation during fetal life. For it will be remembered that its anlage, the wolffian body, was originally a pelvic structure and that as the kidney forms it rises with its hilus directed anteriorly. Wherefore it not only must seek its postfetal bed but it must turn its hilus toward the

spinal column. If it fails in the first the organ may be found at almost any plane between these extremes and if it fails in or overdoes the second its hilus may be directed toward almost any point of its latitudinal circle.

Since renal roentgenograms have become such common diagnostic procedures, it has been forced upon our attention that few organs differ more frequently and widely in both form and position from what we have grown to visualize as normal. So true is this that the urologist now talks of kidneys as being "within normal limits" as to both of these features.

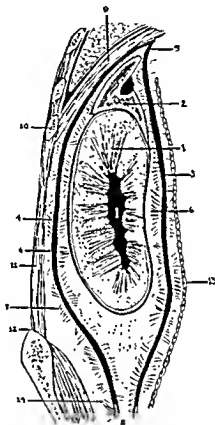


Fig. 34.—The kidney and its surrounding structures. 1, The kidney and its pelvis; 2, the suprarenal gland; 3, the pre-renal fascia; 4, the postrenal fascia; 5, junction of the pre-renal and postrenal fasciae; 6, postrenal fat; 7, pararenal fascia; 8, gap between the lower extremities of the pre-renal and postrenal fasciae; 9, the diaphragm; 10, the twelfth rib; 11, the quadratus lumborum muscle; 12, the crest of the ilium; 13, parietal peritoneum; 14, adipose and cellular tissue in the iliac fossa. (After Testut, Jacob and Guiteras.)

The *kidney pedicle* is composed mainly of the renal artery, veins and nerves and, as differs the location of the kidney, so differs the length of its pedicle. The kidney, not infrequently, also is supplied by polar vessels which, at times, bring about pathology, producing obstructions to the emptying of the renal pelvis or upper ureter. Within the substance of the organ the blood vessels divide in such a way that those going to the cortex are mainly terminal, though a few pass through the capsule and anastomose with vessels in the perirenal fat. The vessels of the pyramids anastomose rather freely.



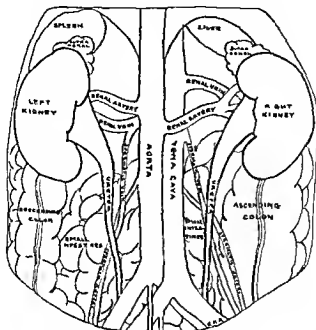


Fig 35—Outline of relations of the kidneys and ureters to other abdominal structures—posterior aspect

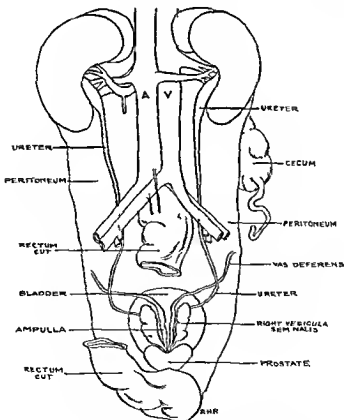


Fig 36—Diagram showing the relations of the urogenital organs to other structures—posterior aspect

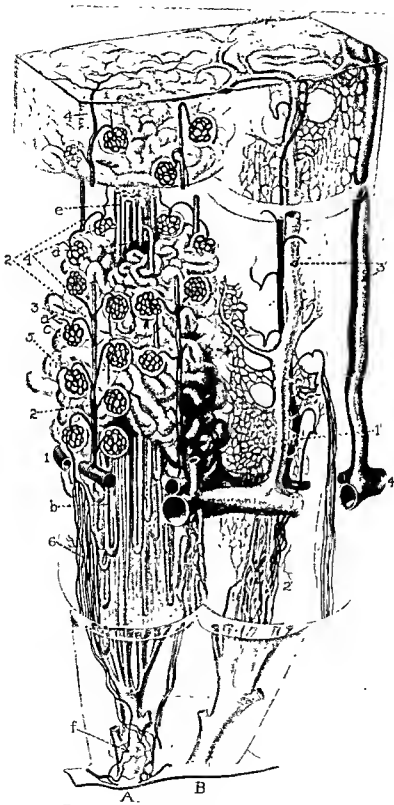


Fig. 37.

The *lymphatics* of the cortical portion of the kidney, particularly the subcapsular networks communicate freely with those of the perirenal fat, making it a simple matter for the extension of infection of the cortex into this region. The parenchymal lymphatics empty into trunks passing out with the renal artery and vein to lymph nodes in the regions of the aorta and vena cava. Also there is said to be a close connection between the parenchymal lymphatics and those of the ureteral sheath. And it is through these that infections in some cases are supposed to spread from the lower genital structures. This possibly has been the subject of much discussion and is doubted by most urologists.

The kidney receives its nerve supply from the renal plexus, which is made up of branches from the eleventh and twelfth spinal nerves, sympathetic fibers from the semilunar ganglion, the coeliac and from the vagus and splanchnic nerves. That renal excretion is not solely dependent upon nervous stimulation is suggested by the fact that seemingly complete renal denervation does not interfere with renal function to any marked degree.

**Function**—The complete function of the kidney, like that of many other organs, is not understood to an extent sufficient to remove much of it from a highly controversial state. We have however advanced far enough in our knowledge of it to show that it is not solely that of taking water and waste products from the blood stream and passing them on to the urinary conducting structures. Aside from its function in removing these nitrogenous waste products and fluid from the blood, it serves as a very important regulator of the blood as well as of all of the body tissues. For much of the maintenance of a proper salt balance and the alkalinity of the tissues is a function of renal activity.

Few body functions are more remarkable than is this regulatory action of the kidney, particularly in the maintenance of the acid alkali equilibrium of the blood. For so narrow is the range of hydrogen ion concentration of the body tissues compatible with life and health that those substances responsible for its maintenance within this range must be kept at almost a fixed level. Just so soon as diet or other causes tend to bring their concentration above this level the kidney must remove them from the blood stream as it also must hold them back when they tend toward the other extreme.

Thus not only is the kidney an excretory organ but it is also an absorbing structure. After it has excreted water, salts, sugars and perhaps other substances, it reabsorbs part of some and all of others during their passage through the renal tubules. What reaches the kidney pelvis is the end product and this end product often varies greatly in quantity and content in the same individual from hour to hour.

So great is the variation of quantity in different individuals and at different times in the same individual that one must speak in averages instead of exact amounts. And while we are in the habit of calling an output of from

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Fig. 37.—Schematic portrayal of the unit of kidney structure. A Central tubular arrangement with peripheral circulation forming cylinder like unit. a Proximal convoluted tubule b Henle's loops c distal convoluted tubules e collecting tubules f ducts of Bellini Arterial tree 1 interlobar or arcuate vessels 2 interlobular 3 afferent glomerular 4 glomerular 5 efferent glomerular 6 arteriae rectae B Venous tree 1 plexus of collecting veins 2 venae rectae 3 interlobular 4 arcuate and interlobular veins (Hinman Principles and Practice of Urology W B Saunders Co)

1500 to 2000 c.c. of urine in the twenty-four hours normal, it is by no means unusual for those in perfect health to pass far larger or, even, far smaller quantities in that period of time. Thus, there is a great need that the clinician take into consideration these variations and the events that so often are responsible for them before he concludes that he is on the trail of true functional perversion. It is important that he rule out the questions of fluid consumption, diet, nervous stress, lack of activity on the part of the skin surfaces, surface temperature and the like before he concludes that the patient passing larger amounts of urine does so because of some disease process. And, where quantity is markedly reduced his quest should include the reverse of some of these factors.

Where substances that should not be present in normal urine are found, he more often encounters true pathology, but, even here, he does well to take into consideration the influences of diet, physical fatigue, gastroin-

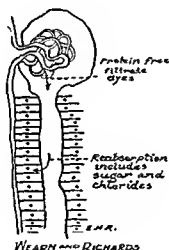


Fig. 38.—Scheme to show simpler forms of renal excretion and absorption. (After Wearn and Richards.)

testinal activity and cardiovascular changes before he condemns the kidney that so often is the victim and not the original cause.

Again, there are the changes in function so common to advancing age that they almost could be called normal for the individual. Clinically he will meet many older patients who, because of a renal inability to concentrate urine, find it necessary to arise one or more times at night to empty the bladder. For, like most other organs, the kidney as it ages often loses much of its functional flexibility and, what commonly is normal for individuals at their age, rather easily may be viewed as disease.

Many of these changes will be alluded to from time to time, particularly in a discussion of the urine itself, but it is important that there be a realization of the fact that there is such a thing as a normal, often wide range of renal flexibility which is in no sense associated with disease, and that the extremes of this range may shift in one direction or the other as age advances.

## THE RENAL PELVIS

**Anatomy**—The kidney pelvis is a fibromuscular funnel for the collection of urine from the renal pyramids and its passage into the ureter. Its offshoots passing to the pyramids, the calices, end as sharply margined cup-shaped structures into each of which the pyramid tips project. The number of these calices varies in different individuals and even on opposite sides in the same individual. The pelvic wall contains both longitudinal and circular muscle fibers. The latter are particularly prominent at the calices and at the junction of the pelvis with the ureter. They are far less marked and, often, almost absent in the true pelvis.

The blood supply of the kidney lies anterior to the pelvis, though it is by no means uncommon to find arteries and veins of considerable size pass

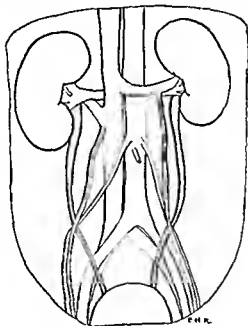


Fig 39—Relations of the kidney pelvis and ureters to the abdominal arteries and veins—  
anterior aspect

ing posterior to it. The lymph channels drain into the lymph nodes in association with the renal blood vessels.

Perhaps nowhere in the human body do we see greater variations between the two extremes of possible normal than occur in the kidney pelvis. The pelvis may be entirely surrounded by kidney tissue (*intrarenal pelvis*), it may be almost entirely extrarenal with only the calices inside the kidney structure or it may be at any point between these extremes. There may be one pelvis or two and almost every conceivable arrangement between. Likewise there may be a few or many major calices. Further, the pelvis may be normally small or quite large, with a capacity ranging from 3 to 12 c.c. or more.

Our roentgenologic studies of the kidney pelvis have shown us these great variations and have revealed a rather confusing diagnostic field upon

which volumes have been written. There is little need that one should burden his mind with a recognition of every type of kidney pelvis that has been described. And a study of the illustrations depicting roentgenographic studies of the pelves appearing in the sections on radiography serves to bring out the confusion that exists regarding the normal kidney pelvis and to suggest the hazards of diagnosis based solely upon such studies.

**Function.**—The only known function of the kidney pelvis is that of collecting the urine from the kidney tubules and propelling it into the ureter. Muschat has shown rather conclusively that each kidney pyramid tip is subjected to a sort of milking action by the so-called "milking muscle" of its corresponding calix. Urine thus obtained is passed on into the kidney pelvis proper where the contraction is much less in evidence, if it really occurs at all, than is the case with the ureter. In fact, urine obtained by means of a ureteral catheter, the tip of which is in the true kidney pelvis, flows out drop by drop as though its propelling force were tissue-pressure and not true peristalsis. This is likewise suggested by the fact that it takes the pelvis one and one-half minutes or longer to empty itself of even a small amount of opaque fluid. The shape of the kidney pelvis alone would suggest that tissue pressure must be a large factor in its emptying, as its renal end could not possibly contract to a sufficiently small caliber to propel into the ureter the few drops of urine that pass into the bladder with each peristaltic wave of the ureter. Serial roentgenograms of the kidney pelvis filled with opaque fluid show no direct evidence of such a peristaltic wave as is so plainly seen in the ureter. They show a gradual decrease in density as the fluid passes into the ureter but no definite peristaltic change in contour.

Not only does the ureteral catheter in the kidney pelvis fail to show evidence of rhythmic contraction of that structure but, under normal conditions, it fails to show the steady urinary drip so characteristic of a full kidney pelvis, as would be the case were it in any great sense a reservoir for urinary accumulation.

The entire picture seems to show that urine is passed from the minor calix into the major calix and from there into the true kidney pelvis by virtue of a peristaltic wave; that the true pelvis acts as a passive collecting structure from which urine is sent by tissue pressure alone past the ureteropelvic outlet into the relaxed upper ureter, where it is grasped by a peristaltic wave and propelled to the bladder. The passive function of the true kidney pelvis is further suggested by its lack of spasm in the presence of calculi either large or small. It is not the rule for structures capable of a peristaltic wave to behave so innocently in the presence of a foreign body.

#### THE URETER

**Anatomy.**—The adult ureter varies from 23 to 32 cm. in length and in diameter from 2 to 10 mm. in its various portions. It is common custom to divide the ureter clinically into three portions: the lumbar, pelvic and intramural segments.

The *lumbar portion* of the ureter starts from the pelvic junction where it averages 2 mm. in diameter, widens out to about 10 mm. and then narrows to 4 mm. at the brim of the pelvis. This portion of the canal is from 12 to 17 cm. in length and lies upon the fascia of the psoas muscle posteriorly about 2 cm. from the spine. Anteriorly it rests upon the perit-

oneum. The position of the right ureter likewise gives it an added importance by virtue of the fact that it lies behind the duodenum, the ileum and, at times, the appendix, and may be influenced by diseases in these structures.

The *pelvic portion* of the ureter, from 11 to 15 cm in length, passes from the above narrowing at the pelvic brim along the posterolateral

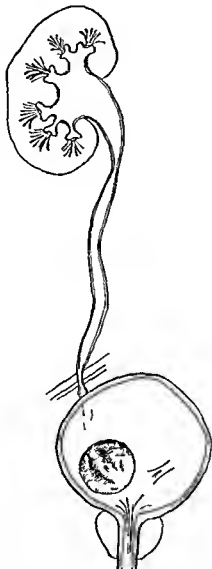


Fig. 40—Kidney pelvis ureter ureteral ridge and meatus

curvature of the pelvis and turns forward to the bladder wall where it again narrows to from 2 to 4 mm in diameter.

The vas deferens loops between the ureter and the bladder wall and, usually, the tip of the *seminal vesicle* overlies the point where the ureter enters the bladder wall.

The *intramural portion* of the ureter passes diagonally through the

coats of the bladder to the ureteral orifice. It narrows to from 3 to 5 mm. at the ureteral orifice.

In the female the ureter enters the broad ligament below the ovary, crosses the uterine artery, and passes laterally to the cervix, through the tissue between the bladder and the vagina to its point of entrance into the bladder.

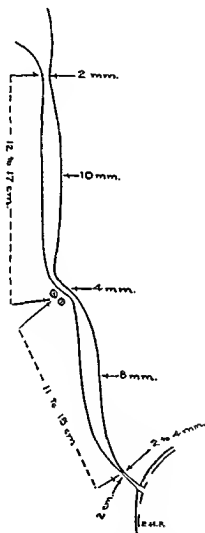


Fig. 41.—Average diameters of the ureteral lumen and the lengths of its three divisions.

The ureter exhibits three definite coats; a rather dense outer *fibrous coat*, a thick *muscular coat* showing longitudinal and circular fibers of considerable strength, and a *mucous layer* composed of loose submucosal tissue surmounted by stratified transitional epithelial cells. The *submucosal coat* of the ureter is very rich in lymphatics and blood vessels.

The *blood supply* of the ureter comes from the renal, spermatic, superior vesical and internal iliac arteries. In the female the uterine and inferior vesical arteries send branches to the ureter.



There are said to be two intimate systems of *lymphatics* the submucosal and the periureteral which blend with those of the kidney on the one part and the bladder on the other emptying into the lumbar and pelvic lymph nodes. Aside from an intimate association with the lymphatics of the bladder the ureteral lymphatic return is closely intermingled with those of the prostate seminal vesicle and the loose subvesical areolar tissue.

The *nerve supply* of the ureter comes from the renal plexus the upper sacral ganglia the inferior hypogastric plexus and the vesical plexus.

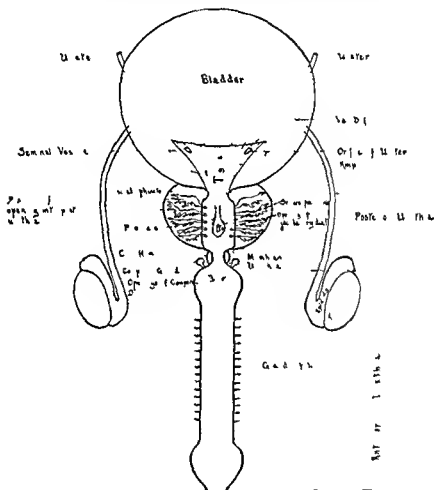


Fig 47 Diagrammatic outline of the lower urogenital tract

**Function**—Like the kidney pelvis the ureter is solely a conducting structure for the urine. Urine passing into it at the *ureteropelvic junction* is grasped by a wave of peristalsis and propelled rather rapidly to that portion of the canal passing diagonally through the bladder wall the *intramural portion*. Here it accumulates a moment the ureteral ridge in the bladder is drawn up the ureteral orifice opens and a wave of contraction expels the jet of urine into the bladder with some force. When obtained by the ureteral catheter this jet of urine is seen to vary in size from a few

drops to fifteen or twenty. The frequency of the ureteral wave varies from one to four or five times a minute, depending upon the volume of urine and the nervous make-up of the individual. The peristaltic waves of the two ureters are not synchronous, but show a fair degree of regularity in their alternations.

The diagonal direction of the intramural portion of the ureter tends to make a natural valve preventing the regurgitation of urine from bladder to ureter. This valve-like action is reinforced by muscle action at the ureteral orifice which allows the intramural ureter to fill before being emptied into the bladder. This slit-like orifice, cystoscopically, seems to be shaped thus by muscle fibers running parallel on both sides of the opening from the vesical side of the ureteral ridge to the trigone. In order to open this orifice it appears as though a muscle in the posterior wall of the ureter and running longitudinally to it contracted in such a manner as to overcome the trigonal tug on the orifice and thus relieve the tension of the fibers on its lateral margins.

In contradistinction to the renal pelvis, the ureteral mucous membrane is supplied with a nervous mechanism which generally throws the ureter into violent muscular spasm or increased peristalsis during the passage of any foreign body which causes definite mucosal trauma, such as the passage of a calculus. At times, the passage of a ureteral catheter brings about a similar contraction. More often, the presence of the catheter is well borne by the ureter but produces a reflex renal anuria of short duration. And, on the contrary, the mere presence of a catheter in the ureter often will terminate a renal anuria that has persisted for some time.

By the use of ureteral roentgenograms taken at frequent intervals much has been learned about the behavior of the ureter under varying circumstances. Particularly have we learned that the ureter in its upper reaches is capable of a considerable range of mobility in many individuals. And we have learned that many of the cases that we have viewed as ureteral kinks were not in reality kinks, but merely the excursion of the upper ureter due to the change of renal position as the result of posture or respiration, and were normal to the given individual. Also, we have learned that ureteral pathology, as evidenced by dilatation, is not of necessity a permanent condition, for, on the removal of the cause many such ureters gradually approach or entirely regain their normal caliber.

### THE BLADDER

Anatomy.—The bladder is a hollow, fibromuscular organ varying greatly in size in different individuals. Its *capacity* ranges from 150 to 300 c.c. or more. It has a very complex musculature with fibers running longitudinally, circularly and in almost every direction. These collectively have been called the *detrusor muscles*. There is no definite dense *fibrous coat* to the bladder such as appears in the ureter. The *inner coat* of the general bladder wall is covered by transitional cells arranged in several layers on a very loose submucosal structure. In the trigonal area the mucosa is rather firmly attached to the subjacent tissue. When the bladder wall contracts the mucous membrane is folded into countless irregular *rugae* as the result of the loose submucosa. When relaxed in the filling position, however,

the posterior and upper bladder surfaces fold transversely so that the upper portion of the surface lies across the vesical outlet, and the mucous membrane does not show the rugae of the contracted bladder

The *trigone* is a triangular area on the bladder base. Its posterior angles are at the ureteral orifices and its anterior at the vesical outlet. It is a most interesting and, really, a most important portion of the viscus, for, while in health the general bladder wall plays a largely passive part, the trigone functions busily. Not only are the functions of the trigone of a sensory nature, but Wesson has shown very conclusively that it has a very important muscular arrangement which has to do with dilation of the vesical outlet. Certain bands of the trigonal muscle pass from ureteral orifice to ureteral orifice, often forming a distinct ridge at the posterior edge of the

down the posterior vesical lip, the detrusor muscle draws the lateral margins of the outlet outward. Thus, the outlet in its dilated condition becomes almost a circular opening instead of the slit-like opening that would occur if the trigonal muscle were the only dilating factor.

For purposes of orientation the inner surfaces of the bladder have been divided arbitrarily into the base, right and left lateral, superior, anterior and posterior walls. Such a division of a rounded organ naturally compels the use of combinations of terms such as posterolateral, anterolateral and the like. The bladder base is divided into the trigone, the rettortigonal region, (*bas fond* or *fundus*), the lateral trigonal areas and the vesical outlet.

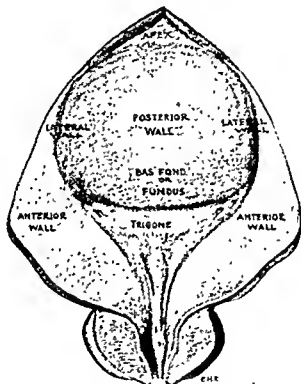


Fig. 44.—The arbitrary division of the interior surfaces of the bladder.

The bladder receives its *blood supply* from branches of the anterior trunk of the hypogastric artery and branches of the obturator and anterior gluteal arteries. The veins do not follow the arteries but pierce the bladder wall directly to empty eventually into the iliac veins. The vessels seen intravesically by means of the cystoscope show a very different distribution of the circulation on the trigone as compared with that of the general bladder wall. The vessels in the general bladder wall have no uniformity of course, whereas, those of the trigone run fan-wise from the vesical outlet. Such a marked difference in the direction of the blood vessels is a distinct help to the cystoscopist in his efforts at intravesical orientation.

The *lymphatics* of the bladder follow the veins, forming larger channels in the muscular and subperitoneal regions which empty mostly into the

lymph nodes along the great pelvic vessels. Those of the base of the bladder are particularly intermingled with the lymphatics of the prostate and vesicular region.

The superior and posterior portions of the bladder wall are covered by the reflected layer of the peritoneum which dips down to some extent upon the lateral surfaces of the bladder. The anterior surface of the bladder wall for an area of an inch or so above the pubic bone (when the bladder is dis-

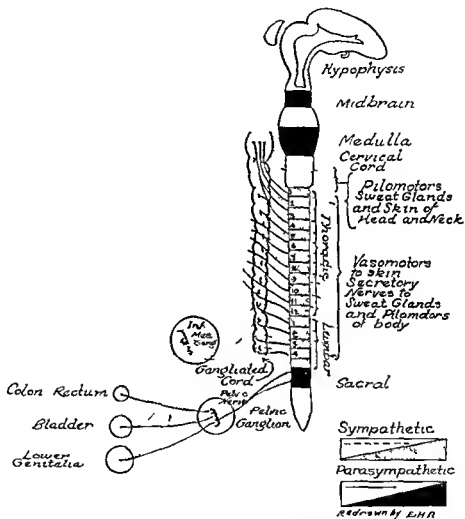


Fig. 43.—Diagrammatic outline showing the origins of the sympathetic and parasympathetic paths to the genitalia. (After Meyer and Gottlieb.)

tended) is usually free of peritoneum, although the peritoneum occasionally does go lower than this on the anterior wall—a point of considerable danger in the passage of a trocar through the abdominal wall into the bladder for the relief of urinary retention.

The posterior portion of the bladder wall is in relation with the intestines and rectum in the male and with the uterus and vagina in the female. At the vesical outlet in the male it is in relation with the prostate and seminal

vesicles on its lower surface. Between the anterior surfaces of the bladder and the pubic bone is a region of loose areolar tissue called the *space of Retzius*, or *prevesical space*.

The *nervous mechanism* of the bladder and its sphincters is a decidedly complex one but an understanding of it is of great importance to him who intelligently would treat its many departures from normal function. There is in it an unusual mingling of somatic, sympathetic and parasympathetic pathways. The *sympathetic fibers* pass largely through the superior hypogastric and sacral plexus of nerves. The former lies beneath the peritoneum and anterior to the body of the fifth lumbar vertebra. It is in intimate con-

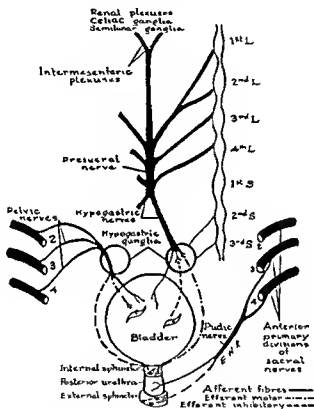


Fig. 46.—Diagram illustrating the origin of the nerve supply of the bladder and its sphincters. (After Learmonth.)

nection by means of the presacral fibers with the latter, the sacral plexus. These sympathetic fibers, according to Learmonth, exercise excitatory control over the vesical sphincter muscles and inhibitory control over the detrusor muscles. Stimulation of the presacral nerves, from which the sacral plexus obtains its nerves, causes contraction of the muscles of the ureteral orifice, the trigonal muscle and those of the internal sphincter. Removal of the sacral plexus, in the presence of spasm of these muscles, relieves the spasm and thus removes much of the opposition to the action of the detrusor. As the sympathetic impulses to these regions cause closure of the vesical outlet, they have been called the "filling nerves" in contradistinction to those of the parasympathetic nerves, which have been called the "emptying nerves."

The *parasympathetic fibers* come from the second, third and fourth sacral nerves and merge with those of the sacral plexus. It is believed that they serve as inhibitors to the sphincter muscles of the vesical outlet and exciters to the detrusor muscle of the bladder. With them go the *sensory fibers* that have to do with the reflexes of urination, and it is possible that they also control in some measure the muscles of the bulbar urethra.

The *somatic or true spinal fibers* come from the internal pudic nerves and carry volitional impulses to the vesical sphincters. A study of the accompanying illustrations makes it possible to trace out these various fibers better than would prolonged description of them. Of particular interest in this regard is Dr. Herman's drawing which brings out the point, commonly overlooked, that the inhibitor fibers play as great a part in normal bladder function as do the excitor fibers.

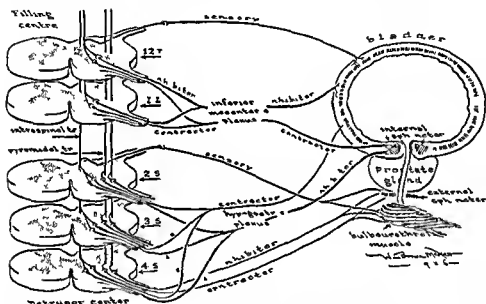


Fig. 47—Diagram in which are brought out the sensory fibers and the motor accelerator and inhibitor fibers of the nerve control of the bladder and its sphincters (Herman: *The Practice of Urology*, W. B. Saunders Co., Philadelphia)

**Function**—The function of the urinary bladder is essentially that of a reservoir for urine. Under normal conditions it is perhaps the best-behaved organ in the body. It gradually fills with urine, a process of which the individual is utterly unconscious, until such time as there has accumulated a sufficient quantity of urine to begin to put the trigone on a stretch. This causes a conscious desire to empty the viscus. Then, through an act of volition, the trigono-urethral and, perhaps, the detrusor muscles contract and open the vesical outlet, the detrusor muscle then further contracts, and, with some force, expels the contained urine. The detrusor and trigono-urethral muscles then relax, the vesical outlet closes and the cycle is repeated.

Since it takes place in the first portion of the tract from above downward that is under the control of the conscious mind this method of be-

havior is easily disturbed by psychic meddling with this otherwise automatic cycle of events. Because of this, there enters into the clinical picture an assortment of variations from the normal that can be viewed readily as evidences of disease. And it is for this reason that one should be thoroughly familiar with the influences of the mind upon this organ and its function. Under several future headings these vagaries will be considered in much detail, for they are most fertile sources of diagnostic error.

An interesting feature of the filling of the bladder and the call for its emptying lies in the fact that the first call comes before the bladder is filled to the point of possible capacity. If this summons is disregarded, the desire to urinate ceases for a considerable length of time and then returns with somewhat greater insistence. If this second summons is disregarded there usually is a far longer interval before the third and far more urgent call occurs. Should this third summons be disregarded there ensues a constant feeling of bladder distention that often amounts to real pain. The longer this is allowed to persist the more difficult, as a rule, does the individual have in relaxing his sphincters to empty the organ.

While there is considerable difference of opinion among various investigators regarding the true mechanism of bladder filling and emptying, one rather safely can attribute most of it to the trigone and its sensory structures. That the so-called stretch reflex of the general bladder wall may be a factor is suggested by the work of some investigators. The fact that irritation of, or slight pressure on the trigone, even when the viscus is empty, causes an urgent desire to urinate, while the same influences applied only to the general bladder wall do not, is highly confirmatory of the predominant rôle of the trigone. That deep pathology of the bladder wall, notably paramural cystitis, may cause detrusor spasm does not necessarily render such a view untenable. Irritation of the ganglia in the submucous and muscular coats could easily account for such a phenomenon in the absence of any trigonal stimuli. The same is true, probably, of any inflammation that involves even the submucous coat. That such can and commonly does occur is in no sense evidence that normal desire for urination does not arise primarily from trigonal stretch.

Because the nervous mechanism of bladder control is further discussed under the subject of Neurogenic Bladder, there is little need that it be discussed further in the present connection.

### THE URETHRA

**Anatomy.**—The male urethra, beginning at the vesical outlet and extending to the external urinary meatus, for clinical purposes is divided into three portions, the anterior, the membranous, and the posterior or prostatic. It varies in length in different individuals and in diameter in its various portions, both in different individuals and in the same individual. It has a natural constriction at the vesical outlet, another at the membranous urethra, and a slight constriction at the external urinary meatus. The two inner constrictions, however, are due to muscular action and are not true narrowings of the canal.

The *posterior urethra* extends from the vesical outlet to the posterior layer of the triangular ligament. It varies from 2 to  $3\frac{1}{2}$  cm. in length and



is the most distensible portion of the canal. In the upright position it runs practically in a perpendicular direction. At rest it is closed at both ends by the action of sphincteric muscles. The one in front, the *compressor urethrae muscle*, being by far the stronger. In fact, the sphincter at the vesical outlet is a very weak sphincter and does not offer much resistance to passage of fluids in either direction. Along the midline, on the floor of the posterior urethra, runs a *median raphe* which, in its midportion, shows a distinct en-

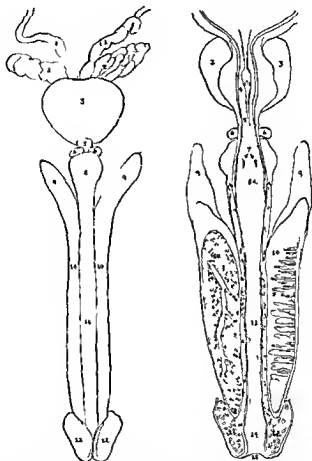


Fig. 48—Posterior and anterior aspects of the urethra and its adnexa. 1, Ampulla of the vas deferens, 2, seminal vesicle, 3, prostate gland, 4, posterior urethra, 5, membranous urethra, 6, Cowper's glands, 7, openings of Cowper's ducts, 8, bulbar portion of the anterior urethra, 9, crux of the corpus cavernosum, 10, corpus cavernosum, 11, corpus spongiosum, 12, glans penis, 13, penile portion of the urethra, 14, fossa navicularis, 15, external urinary meatus.

largement, the *verumontanum*, a spongy glandular mass of tissue in the center of which is the *sinus pocularis* or *colliculus*, the vestigium of what becomes, in the female, the uterus. The colliculus is a blind pouch of from a few millimeters to 1 centimeter in depth. The ejaculatory ducts pass through the *verumontanum* from above, then downward, forward and inward to empty on its anterior surface on each side of the colliculus, rarely within it.

Underlying the posterior lip of the vesical outlet is the *median commissure* of the prostate gland and on the distal surface of this, the urethra takes quite a sharp dip, forming what is called the *declive*. In the lateral sulci to each side of the verumontanum and median raphe open the *prostatic ducts* which vary greatly in number. Some of these empty into the urethra on each side of the midline on the anterior surface of the median prostatic commissure.

The posterior urethra has a mucous membrane rather firmly fixed to the subjacent tissue and presents longitudinal and circular muscle fibers. The latter are particularly heavy and apparently reinforce the contracture of the vesical sphincter to some extent.

The *membranous urethra*, 1 to 1.5 cm. in length, lies between the anterior and posterior layers of the triangular ligament. This portion of the canal is entirely surrounded by the *compressor urethrae* or *cut-off muscle*. This

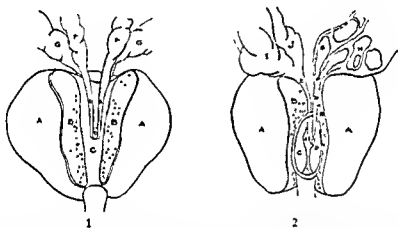


Fig. 49.—Diagram to show the relations of ejaculatory ducts to the posterior urethra and the prostate gland. 1, A section has been removed from the posterior portion of the prostate down to, but not into, the urethra. (After Toldt.) 2, A section has been removed from the anterior portion of the prostate and the anterior urethral wall. (After Spalteholz.) A, Lateral lobes of prostate. B, Cut surfaces of the prostate. C, Urethral wall. D, Sinus pocularis (colliculus). E, Ejaculatory ducts. F, Ampullae of the vasa deferentia. G, Seminal vesicles.

muscle being normally in tonic contraction except at the time of urination or ejaculation, the membranous urethra is practically a closed portion of the canal and forms a definite barrier against the passage of things from the anterior to the posterior urethra. Here, again, the mucous membrane is firmly fixed to the subjacent tissues and differs from that of the rest of the urethra in that it has no glandular offshoots of any type.

The *anterior urethra*, being that portion of the canal distal to the anterior layer of the triangular ligament, varies from 12 to 15 or more centimeters in length and varies in diameter in different individuals. The entire portion of the canal exhibits a definite layer of longitudinal muscle fibers. That portion known as the bulb, which is approximately the posterior quarter of the anterior urethra, shows definite circular muscle fibers which are lost anterior to this point. The diameter of the bulbar urethra is much greater than that of any other portion of the canal. The floor of the bulbar

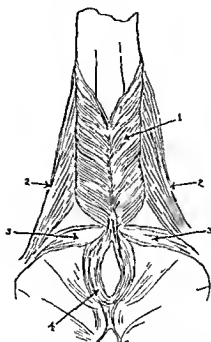


Fig 50.—Muscles of the bull's perineum. 1, Bulbocavernosus 2, Ischiocavernosus 3, Transversus perinei 4, Sphincter ani externus

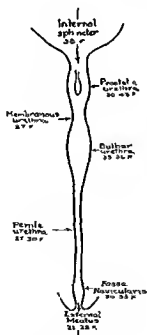


Fig 51.—Diagram showing the average calibers of the various portions of the urethra

urethra is much lower than the opening into the membranous urethra, so that it is necessary definitely to raise the tip of instruments being passed from before backward

The mucous membrane in this portion of the canal is covered by columnar cells, is loosely attached to its muscular layer and shows many mucous crypts and glands. These are known as the *crypts of Morgagni*, and the glandular offshoots as the *glands of Littre*. The depths of these glandular structures vary in different portions of the canal. Those on the roof being, as a rule, much longer than those on the floor of the urethra. Some of the former, in fact, running deep into the submucosa. In the anterior two-thirds of the anterior urethra their direction is from before backward, while those of the bulbar portion run from behind forward, a point of much importance in a consideration of their topical treatment. The distal centimeter of the anterior urethra is called the *fossa navicularis*. It is lined by a protective type of epithelium, squamous, which is firmly attached to the subjacent tissue.

It is not uncommon to find paraurethral sinuses near the external urinary meatus passing through the glans penis in various directions.

The entire anterior urethra is enveloped by an erectile mass of tissue called the *corpus spongiosum* which is continued anteriorly as the glans

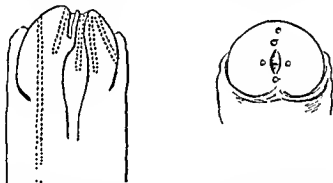


Fig. 52.—Diagrams to show the more common locations of the openings of paraurethral sinuses and the courses pursued by these abnormal mucous channels.

penis. The posterior, bulbar or proximal portion of the corpus spongiosum, is surrounded by a herring-bone muscle, the *bulbocavernosus muscle*, which accentuates the force of the circular muscle fibers of this region and gives propulsive force to the seminal fluid. This muscle is likewise instrumental in emptying the last few drops of urine, which have a tendency to settle in the bulbar urethra unless the contraction of this muscle takes place.

**Function.**—The main physiologic function of the urethra is the conveyance of urine and of seminal fluid from their reservoirs outward. With its accessory mucous channels and its surface cells it exercises a secretory function as well. Also, it receives the fluids from the prostate and Cowper's glands.

At the vesical outlet there occurs a rather weak sphincter action which, under ordinary circumstances, prevents fluid from escaping into the urethra from the bladder. This weak sphincter is somewhat reinforced by the circular muscle fibers surrounding the entire posterior portion of the canal. The arrangement is such as to force backward into the bladder any quantity of fluid entering the canal when the distal sphincter, the cut-off muscle, is in its normal tonic contraction. This distal sphincter is, in health, a powerful

one and is the main factor in the ability to retain urine within the bladder. Without its action the male is by no means safe under muscular stress. In the action of these sphincters appears the only voluntary control found in any portion of the urinary tract, except that of the bulbocavernosus and erector penis muscles.

While the control mechanism of the vesical outlet is fairly well understood, that of the stronger sphincter is somewhat more difficult to explain. As has been described previously, the sphincter at the vesical outlet is pulled open by the contraction of those muscles passing from the ureteral ridges through the sphincter to find attachment in the floor of the posterior urethra at the base of the verumontanum and the detrusor muscles. Following this action there occurs a relaxation of the cut-off muscle.

While the opening and closing of these sphincters are under the control of the will, it is obvious that the sensation caused by the passage of urine through the canal keeps up this sphincteric relaxation. Though the opening and closing of the sphincters require a degree of mental concentration, such concentration is not normally required to keep them open long enough to allow the bladder to empty.

The older explanation of the act of urination wherein it was supposed that the escape of a few drops of urine into the posterior urethra alone set up the desire to urinate, does not square with our clinical experience. One may paint the entire posterior urethral mucous membrane with even caustic chemicals without exciting the slightest desire to urinate. If, however, a drop of such a solution finds its way onto the trigone there occurs the most intense desire to urinate associated with great vesical tenesmus. Obviously the normal desire to urinate arises from stretching of the trigone and the more sensitive the trigone, the greater and more frequent the desire.

At the end of the act of urination the sphincters are automatically or voluntarily closed and there usually is brought about a synchronous contraction of the muscle surrounding the bulb of the corpus spongiosum, to empty the bulbar portion of the canal. If this latter contraction does not take place, as is the case in many individuals with generally atonic muscles or who have indulged in excessive coitus a number of drops of urine slowly dribble after the supposed completion of urination.

In the expulsion of seminal fluid the mechanism obviously differs from that of urination. Apparently the vesical sphincter does not open, or, if it does, the semirectile verumontanum prevents the semen from flowing back into the bladder. The cut off muscle relaxes, the seminal fluid escapes into the bulbar portion of the urethra from which it forcibly is expelled by the spasmodic contraction of the bulbocavernosus muscle. Thus it will be seen that this muscle about which so little is heard has a function of convenience to the individual in that it prevents dribbling after urination and a function of great procreative importance in that it gives propulsive force to the seminal fluid.

Nature, to avoid trouble in the expulsion of the tenacious semen and to prevent its blocking the urethral lumen added a plentiful supply of mucous glands and cells to lubricate its walls. Also, she wisely arranged their nervous mechanism to respond to the slightest sexual stimulation so that the lubrication never should fail.

At the distal extremity of the urethra there also was placed a narrowed opening to act as a nozzle for the tube, something to assure the action of the propulsive *vis a tergo*, and project the urine from the personal habiliments.

### THE PROSTATE GLAND

**Anatomy.**—The prostate gland, within its dense fibrous capsule, extends from the bladder base to the posterior layer of the triangular ligament. It varies in size and shape at different ages and in different individuals. In shape it has been likened unto that of the horse chestnut, with its median furrow directed toward the rectum. Broad at its vesical aspect, it narrows as it nears the triangular ligament.



Fig. 53.—Diagram of the posterior surfaces of the bladder and bulbar portion of the urethra. 1, Ureters. 2, Vasa deferentia and ampullae. (Note that the vas passes between the ureter and the bladder wall.) 3, Seminal vesicles. 4, Prostate gland. 5, Cowper's glands. 6, Bulbar urethra. 7, Bladder wall.

It is pierced from above downward by the posterior urethra in such a way that most of the gland substance lies to the sides and posteriorly to that canal. It is pierced also at its upper posterior surface by the ejaculatory ducts which pass downward, inward and forward to empty on the face of the verumontanum to each side of the sinus pocularis. It is in the region of entrance of the ejaculatory ducts that the prostatic capsule shows its greatest weakness, so that malignancy and, at times, infections have a greater opportunity to break through at this point.

The internal structure of the prostate has given rise to a great deal of controversy which has been settled rather conclusively by the work of Lowsley and of Randall. The rather generally accepted view is that the gland is divided into five sets of glandular accumulations, all of which empty into the posterior urethra through minute channels. These so-called lobes

are known as the anterior, lateral (two), posterior and subcervical. A sixth group of glands, Home's glands, which have occasioned some confusion, are really not in the prostate, but occur just under the trigonal mucous membrane and empty onto its surface.

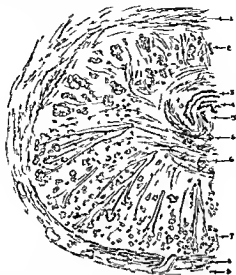


Fig 34—Diagrammatic cross section of the prostate gland 1, Surrounding capsule 2, Anterior lobe 3, Collapsed urethra 4, Utricle 5, Ejaculatory duct 6, Cross cut follicular canals 7, True prostatic substance 8 Large blood vessels on posterior surface 9, Capsule (After Toldt)

In the normal development of the prostate the two lateral lobes come to make up the greater portion of the gland substance. The anterior, posterior and subcervical groups do not enlarge to such an extent.

The *anterior lobe* lies between the urethra and the anterior prostatic capsule. It is composed of comparatively few glandular elements at best and, often, is only rudimentary in character. If active, its ducts empty on



Fig 35—The locations of the various prostatic lobes and the subtrigonal glands

the anterior wall of the urethra. It seldom plays any important part in either infection or hypertrophy.

The *lateral lobes*, as their name implies, lie between the urethra and the lateral aspects of the gland. As has been stated, they form the bulk of the gland. Of great importance in questions of both infection and hypertrophy, they empty into the lateral sulci of the floor of the posterior urethra through a varying number of minute canals.

The *posterior lobe* lies in the midline between the floor of the urethra, the ejaculatory ducts and the posterior capsule of the prostate. Like the anterior lobe, this portion of the gland remains in a somewhat rudimentary state and seldom is of importance in pathologic processes except that it is rather a common site of carcinoma. Hypertrophy of this portion of the gland seldom, if ever, occurs.

The *middle, subercical or Albarran group of glands* occupy that portion of the prostate called the *median commissure*, which immediately underlies the vesical outlet posteriorly. They lie above or anterior to the line of the ejaculatory ducts and empty into the urethral floor just distal to the vesical outlet. Frequently they take an active part in both prostatic hypertrophy and infection and cause much obstruction at the vesical outlet.

*Home's or the subtrigonal glands*, as has been pointed out, are not prostatic glands. In the presence of hypertrophy, as has been shown by Randall, they frequently are mistaken for hypertrophied Albarran's glands, to which they bear no relation.

The various prostatic lobes are divided by fibrous trabeculae of varying degrees of density which are derived from the prostatic capsule. These, in turn, furnish offshoots which form a framework for the support of the individual gland *follicles*. These follicles show varying degrees of complexity, but invariably narrow into minute ducts which empty upon the posterior urethral mucous membrane. Lowsley has shown the number of these openings to be, as a rule, far in excess of fifty.

The *arterial supply* of the prostate comes from the inferior vesical, middle hemorrhoidal and internal pudic arteries and pierces the capsule of the gland in many places. Its veins empty, together with the dorsal vein of the penis, into the vesicoprostatic plexus and thence into the internal iliac veins.

The *lymphatics* of the gland empty into the presacral, hypogastric and iliac lymph nodes. The *nerve supply*, mainly sympathetic in type, comes from the hypogastric plexus.

**Function.**—Despite an almost endless amount of study, the true physiology of the prostate gland is still unproved. The older view that it furnished a vitalizing principle for the spermatozoa is no longer tenable in view of the facts that sperm withdrawn from the epididymides not only are actively motile but they have been used successfully for artificial insemination by a number of workers. There is no doubt that the gland secretion is an ideal diluent for the semen but it certainly is not an essential to its proper purposes.

The work of Lower and others has shown an intimate relation between the prostate, the pituitary and thymus glands but even this has done little to solve the riddle, if there really is one.

The only fixed function of the gland seems to be that of furnishing a lubricant for the urethra to facilitate the passage of semen through it at the moment of orgasm. Such a lone function, however, has not satisfied science and an effort has been made from time to time to give physiologic values to the gland's activity.

One who has carried out prostatic massage on congested glands, and even on infected ones, is prone to feel that an actively functioning gland does furnish something to the system at large that has to do at least with one's feeling of well-being. Such a suspicion is based upon the rather com-



mon return to physical vigor of lagging individuals shortly after the treatments are instituted. That such a return to mental alertness and physical well being often should reflect itself in greater sexual activity hardly can be taken as positive evidence that the gland furnishes a sex stimulating principle. Those who feel dull mentally and below par physically are seldom sex hunters. On the other hand a return to normal together with the fact that treatment has centered attention upon the sexual apparatus and its possibilities in many would turn the mind to pleasurable outlets. No true sex stimulant would be required.

Clinical observation seemingly furnishes those who would read into the gland's function a sex stimulating internal secretion another indication that such might be the case. It is however more than probable that the occurrence is to be attributed to a greater sense of well being than previously was present, and not to true sex stimulation. When the gland undergoes hypertrophy, as we call it, the true gland substance is pushed toward the capsule by the enlargement of certain other portions. This puts a gradual pressure on the secretory portions and seemingly causes greater absorption and a sense of youthful invigoration which awakens the previously sleeping thoughts of sex. The rejuvenated one often feels that he needs a much younger partner and his sex performances even may be carried out with youthful virility for a time. Then increasing intra prostatic pressure is such that gland secretory function no longer takes place the feeling of well being departs as often does the new wife. Drawing the line between what is true sex invigoration and what is psychologic sex stimulation in one who simply feels better is beyond the possibility of science. And though there is evidence to suggest either or both the evidence to prove still is lacking.

### THE SEMINAL VESICLE

The seminal vesicles are two irregular fibromuscular pouches lying beneath the base of the bladder and above the prostate gland. Their directions are diagonal to the midline toward which their lower extremities converge. The angle of this convergence differs greatly in different individuals in some being almost at right angles to the midline. Posteriorly the vesicles are covered by the *fascia of Denonvilliers*. They lie in an area of areolar tissue and at their upper ends are close to the peritoneum as well as overlying the ureters.

The individual vesicle may differ in size and shape from its fellow on the opposite side and no two vesicles are exactly alike in cavity formation. There may be one tubule or several and there may be a few or many diverticular pouches emptying into them. Again the cavity may be relatively simple or it may show the most devious convolutions and infoldings.

At its lower extremity the vesicle narrows into a tube the *ejaculatory duct*, surrounded by circular muscle fibers of sphincteric proportions. At this point of junction there appears the opening from the ampulla of the *vas deferens*. The anatomic arrangement at this point is such that fluid coming from either the ampulla or the ejaculatory duct passes into the seminal vesicle before it can pass into the other canal. That this is so is demonstrated by our roentgenograms of the vesicle following the injection of opaque fluids by way of either the ejaculatory duct or the *vas deferens*. Such a pseudo

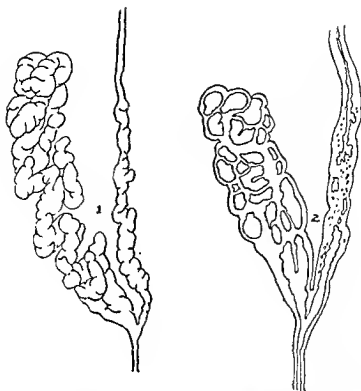


Fig. 56.—Diagrams of the dissected seminal vesicles, ampullae and ejaculatory ducts. 1, External surfaces. 2, Bisected surfaces.

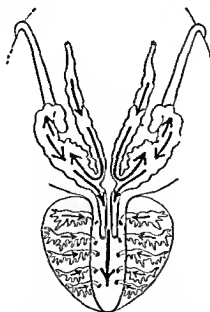


Fig. 57.—Diagrammatic outline of the prostate gland, seminal vesicles, and ampullae to illustrate the normal directions of their fluids.

valvular arrangement is of the utmost importance in diseases of these structures as well as in our understanding of their physiology.

The wall of the seminal vesicle is composed of an outer *fibrous coat*, a *middle coat* of longitudinal and circular muscle fibers and an inner *mucous coat* lined by columnar epithelial cells, many of which are secretory in type.

There is a rich blood supply from the inferior vesical and inferior hemorrhoidal arteries, and an equally abundant nerve supply of sympathetic fibers from the pelvic plexus. Its lymphatic drainage is into the lymph nodes around the internal iliac vessels.

The *perivesicular structures* are such that infections which break through the vesicular walls involve first the intervesicular area and, if they are of such a character as to cause the accumulation of much pus under tension, they burrow either laterally between the layers of the pelvic fascia or upward into the peritoneal cavity. The latter are rare terminations of such infections since, fortunately, involvement of the intervesicular space alone is the rule.

### THE VAS DEFERENS

The vas deferens begins at the epididymal tube in the globus minor as a long, narrow channel for the conveyance of spermatozoa from the epididymus to the seminal vesicle and the ejaculatory duct. From the epididymus it passes upward with the rest of the spermatic cord to the external inguinal ring and on through the inguinal canal and internal ring into the pelvis.

The pelvic portion of the vas deferens crosses the external iliac artery and descends sharply along the side of the bladder. It passes between that viscus and the ureter and almost to the midline where it dilates into the ampulla of the vas deferens.

The *ampulla* is an irregularly spindle shaped expansion of the vas deferens. Much like the seminal vesicle, its inner surface is arranged in irregular folds and pockets. This enlargement makes up a distance of the vas deferens from 2 to 4 cm long. It gradually reduces in diameter until it joins the ejaculatory duct at its junction with the seminal vesicle.

In its entire extent the vas deferens averages about 40 to 45 cm in length, about 15 cm of it being scrotal,  $2\frac{1}{2}$  cm being in the inguinal canal and the rest in the pelvis. In most of its extent it is invested with a sheath, the pelvic portion of which is close around the vas, while the scrotal portion is very loose and is lost over the surface of the *tunica vaginalis*.

The *scrotal portion* of the vas has thick walls and is easily distinguished from the other structures of the spermatic cord by palpation through the scrotal skin. The importance of the *lymphatic drainage* of the vas deferens is great and tends to discount some of the prevalent ideas regarding the transference of infection along this channel. Those from the scrotal portion drain into the iliac and lumbar nodes while those from the pelvic portion empty into the inguinal and iliac nodes.

The vas is composed of a fibrous, muscular and mucous coat. The lining cells are columnar in type and, in the epididymal end, amotile cilia are found on some of the cell margins.

Occlusions of the lumen of the vas deferens occasionally occur congenitally and frequently take place as the result of gonococcal infection. The tube, however, shows remarkable powers of regeneration when severed surgically. Under such circumstances unless the tube is folded on itself

and tied, it frequently will reestablish its lumen even if a portion of it has been removed. It is because of this that vasosection is not a safe operation for the production of sterility unless the tube is folded on itself in such a way as to preclude regeneration.

### THE EPIDIDYMIS

The epididymides are the soft, elongated bodies found on the posterior, superior and inferior aspects of the testes. They can be palpated readily through the scrotal skin and each shows an enlargement at the upper and lower extremities, the *globus major* and *globus minor* respectively. A familiarity with the digital feeling of the normal epididymis is of the utmost importance to the urologist, as he often must base his opinion of its disease or anomalies from palpation alone. To the fingers the structure presents a

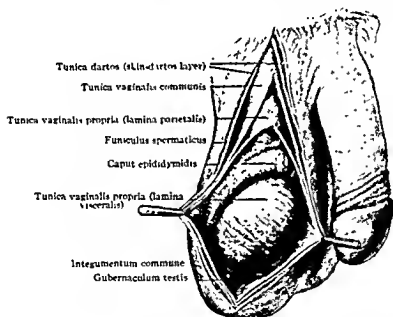


Fig. 58.—Scrotal structure and the scrotal contents. (Callander, Surgical Anatomy, W. B. Saunders Co., Phila.)

soft, bulbous enlargement at its upper extremity, lying almost on the superior aspect of the testicle. This soft area merges into a more dense elongation of uniform diameter clinging close to the posterior aspect of the testis. The line of demarcation between it and the testes, the *digital fossa*, is easily mapped out. At its inferior extremity the epididymis again enlarges, but not to the extent as it does at the upper, nor it is so soft as the upper pole. In fact, it is quite dense in this region and, unless one is familiar with this, he is liable to consider this feeling of resistance as the indurative aftermath of disease.

The epididymis rarely assumes an anomalous relation to the testis though this organ, to which it is attached, is not always in its normal position. For this reason it is not rare to find that the epididymis is not just where one would expect to find it. However, so fixed is its relation to the testicle, that

we judge of the degree of testicular rotation by the direction and location of the epididymis

Except where the ductus epididymidis receives the numerous small tubules as they emerge from the testicle, the structure is composed of a single tubule which is about twenty feet long when unraveled. This minute tubule is composed of an adventitious connective tissue layer, a muscular coat and a mucous membrane covered with tall columnar epithelial cells, some of which are ciliated. Some of the mucosal cells seem to have secre-

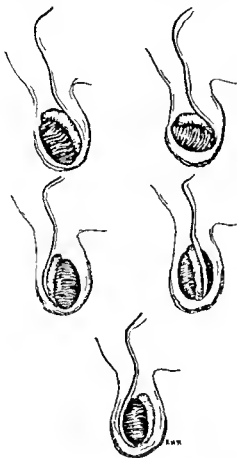


Fig. 59. Normal position of the testicles and the various degrees of rotation. (After Campbell.)

tory function. Throughout most of its extent the epididymal tubule is about 4 mm. in diameter. This tubule eventually enlarges and becomes the vas deferens.

The epididymis, except at the so-called head and tail and at its testicular attachment, is surrounded by the *tunica vaginalis testis*. And it is due to its close proximity to this serous sac that inflammations of it so commonly are associated with an inflammatory effusion into the tunica vaginalis (hydrocele). While the epididymal tube frequently becomes permanently blocked by the fibrous tissue resulting from inflammatory processes, it shows re-

markable powers of reestablishing the continuity of its lumen when severed surgically.

Associated with the epididymides are several rudimentary structures that rarely are of any importance to the urologist. These are at the upper pole and consist of the *appendix of the epididymis* (the pedunculated hydatid), considered to be a detached efferent duct, the *paradidymis* (organ of Giraldes) a remnant of the wolffian body, and the *appendix testis* (the hydatid of Morgagni), a remnant of the müllerian duct. The *aberrant vas of Haller*, at times of considerable length, occurs at about the junction of the middle and lower thirds of the epididymis and is a wolffian body remnant.

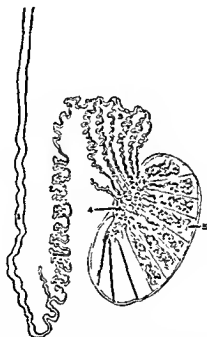


Fig. 60.—Diagram of the lower seminal system. 1, Vas deferens. 2, Epididymal tubes. 3, Vasa efferentia. 4, Rete testis. 5, Lobular structure of testis. (After Toldt.)

*The epididymides have the same blood, lymphatic and nerve supply as do the testes.*

### THE TESTES

The testes are ovoid bodies with slightly flattened sides that vary in size in different individuals. They rest in the scrotal sac with their long axes perpendicular to the long axis of the body in most individuals. Because of their investment by the tunica vaginalis and the looseness of the scrotum they are susceptible of great mobility, a provision that does much to protect them from direct trauma. Tied to them posteriorly are the epididymides which, in turn, are attached to the posterior scrotal wall. This epididymo-scrotal attachment, at times, is loose or missing, allowing the structures to rotate entirely or to assume various degrees of testicular malposition in the scrotum. The visceral layer of the tunica vaginalis is reflected onto the inner scrotal wall as the parietal layer and, thus, forms a closed serous sac. This normal end result may not take place, as the upper extremity of it

## THE PENIS

What might be called the skeletal structure of the penis is composed of two dense fibrous elongated intercommunicating capsules filled with erectile tissue, the *corpora cavernosa*. These structures, of most interesting function are firmly attached at their posterior extremities to the bony ramus of the pubic arch by strong fibrous extensions the *crura*. They also have a secondary attachment by means of suspensory ligaments to the symphysis pubis. Beyond this point they are devoid of further restraining attachments and are freely movable.

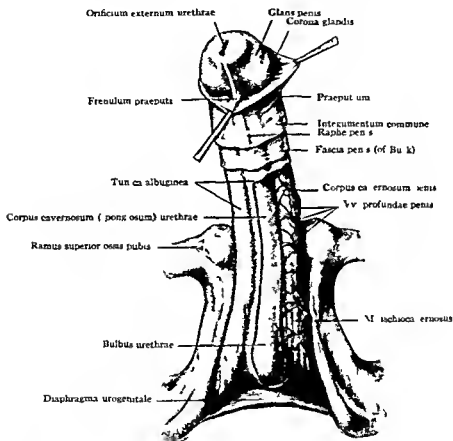


Fig. 67.—Structures of the penis (Callander Surgical Anatomy, W. B. Saunders Co.)

The erectile tissue filling these capsules is made up of tissue grossly resembling the modern rubber sponge. The framework of this spongy structure is composed of fibrous trabeculae covered by endothelial cells. The interstices are really a large series of intimately communicating spaces which empty directly into the veins.

The arrangement of the arterial supply and the intercommunications between the two corpora are such that if any portion of the spongy tissue through injury or disease is changed to scar tissue the unchanged portion distal to it can erect. If such injury is only to one corpus the organ when erect will curve toward the injured side and if both are injured the fibrosed

portion will remain as a flaccid area between the proximal and distal erected portions, a so-called *flail-joint condition*.

The *mechanism of erection* has to do with an interference with venous return, wherein arterial blood is forced into the corporeal interspaces with limited or no means of egress into the effluent venous channels. The stimulus to such circulatory changes as bring about penile erection apparently is from the erectile centers in the spinal cord. These centers are brought into activity by the influences of cerebral impulses, by reflex stimuli from the genitalia and at times from direct irritation to the spinal cord from inflammatory processes. They are rendered incapable of bringing about or sustaining the phenomenon of penile erection by so light a thing as the inhibitory psychic influences of a doubt or a feat.

The two corpora join in the midline in such a way as to form a groove along their under surfaces in which courses the *corpus spongiosum*. This

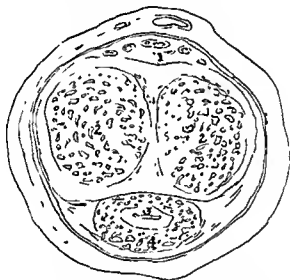


Fig. 63.—Diagrammatic cross-cut of the penis. 1, Dorsal vessels. 2, Corpora cavernosa. 3, Urethra. 4, Corpus spongiosum.

structure starts at the face of the anterior layer of the triangular ligament as a bulbar mass which gradually reduces in diameter as it passes forward, until it reaches the most mobile portion of the penis where it maintains a uniform caliber until it reaches the distal extremities of the corpora cavernosa. Here, it expands into a cap-like structure, the glans penis, which is intimately attached to the presenting ends of the corpora and forms a slightly conical mass of tissue with its apex presenting distally. The corpus spongiosum, while composed of erectile tissue, does not undergo such tense erection as do the corpora cavernosa, but remains during penile erection as a soft, pliable structure. It is pierced at its proximal extremity by the urethra, as it comes through the triangular ligament, and is channeled throughout its length by this canal which opens through a slit, the external urinary meatus, on the distal surface of the glans penis. Surrounding the anterior urethra as it does, the corpus spongiosum is so intimately attached to it that the two



cannot be separated. In fact, it almost may be considered a part of the urethral wall, and it often is pierced by the glandular offshoots of the urethra. For the glands of Littre often extend into it and the ducts of Cowper's glands run diagonally backward through it.

The corpus spongiosum takes no active part in penile erection, though, when inflamed, its induration may be such as to prevent its stretching and thus cause a painful downward curvature of the organ (chordee).

The expanded extremity of the corpus spongiosum, the glans penis, is extremely rich in nerve tissue, having projected toward its surface many nerve end organs which, upon penile erection, become more sensitive to certain types of surface impulses. While these nerve ends increase the

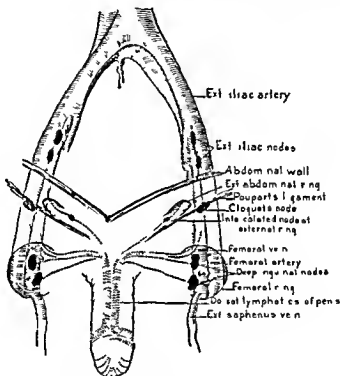


Fig. 64 Schematic illustration of the lymphatic return from the penis (Young's Practice of Urology, W. B. Saunders Co.)

pleasurable sensations of coitus and, together with psychic impulses, serve to precipitate sexual orgasm, they are not in any sense necessary in the reaching of this climax, as this phenomenon is brought about also in individuals in whom the glans penis is missing as the result of disease or operation. On the posteroexternal or coronal surface of the glans penis are a string of small sebaceous glands, *Tyson's glands*, which secrete a whitish substance called *smegma* into the preputial sac.

Surrounding the glans penis is an epithelial covering underlain by an extremely loose layer of areolar tissue. This is not attached to the glans penis, however, but is attached at its base by a reflected layer of epithelium in such a way as to cover the glans. This structure, the prepuce, usually presents a distal aperture sufficiently large to permit of its being retracted.

Because of its loose areolar structure, the prepuce is capable of withstanding the influences of marked inflammatory swellings without destruction. The same, in a smaller measure, is true of the entire penile covering. The penile skin is devoid of hair follicles, though it presents many small sebaceous follicles. Upon the reflected layer of the prepuce inferiorly, at its attachment to the penis, are two or more glandular openings, the *parafrenal glands*. These are of particular importance to the urologist by virtue of the fact that they not infrequently acquire and harbor gonococcal infection.

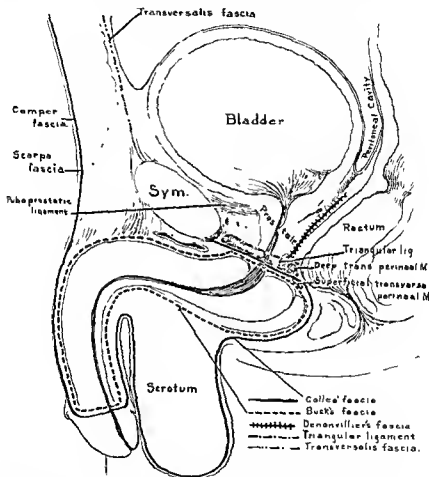


Fig. 65.—Fascial structures of the perineum and external genitalia. (After Wesson, from Callander, *Surgical Anatomy*, W. B. Saunders Co., Philadelphia.)

**Blood Supply.**—The entire penis is richly supplied with arteries, veins and lymph channels. Its arterial supply comes from branches of the internal pudic artery, the artery of the bulb, the arteries of the corpora cavernosa and the dorsal arteries of the penis. The glans receives its blood from the dorsal arteries which, together with the dorsal vein, pass along a slight groove between the dorsal surfaces of the corpora cavernosa.

The veins of the penis empty either into the dorsal vein of the penis or directly into the prostatic plexus. The lymphatics drain into the inguinal, subinguinal and femoral lymph nodes.

The *nerve supply* of the penis comes from the internal pudic nerve, the prostatic plexus and the hypogastric plexus

Of particular interest to the urologist are the *fascial coverings* of the external genitalia. It would take much verbiage to describe these and even then one could not convey the idea nearly so well as Wesson has done in the accompanying drawing (Fig 65). The value of the knowledge of these fascial envelopes rests in their influences in determining the courses followed by extravasated urine. In great extravasation these fascial coverings, of course may be penetrated and thus obscure the diagnostic picture. In the lesser degrees of extravasation, however, it can be seen that *Buck's fascia* would limit it to the penis. *Colles' fascia* would guide the extravasated urine into the scrotum, perineum and suprapubic region. Seemingly, it would infiltrate the penis but, actually, the attachment between Buck's and Colles' fasciae is so intimate that the penis escapes the extravasated urine when it is between these two fascial planes elsewhere.

The *perineal fasciae* or *triangular ligaments* are divided into two layers an upper and a lower more commonly called the anterior and posterior layers. In the space between these two layers lie *Cowper's glands*, and the membranous urethra surrounded by the compressor urethrae, external sphincter, or cut off muscle, as it variously is called. Also, there are found the pudic vessels and nerves and, piercing both layers at their apices, is the dorsal vein of the penis. Around this vein occurs the only weak place of the interfascial space through which extravasated urine could be forced. Escaping thus, it follows the course determined by Colles' fascia. At its caudal aspect the posterior layer fuses with the *fascia of Denonvilliers*, which invests the prostate gland as well as forming a sheath between this gland and the rectum.

### PHYSIOLOGY OF THE GENITAL SYSTEM

The physiology of the genital system is one of the marvels of man and. Perhaps no body functions have been more generously and more carefully planned than have those of spermatogenesis, spermatozoal storage and expulsion. And aside from these processes, looms the internal secretory function of the testes. This latter function alone has received scientific attention since the earliest days of investigation and, even yet, it is but poorly understood. We do not know for certain just what particular part of the testicle is really responsible for the development of truly male characteristics, though we assume it to be due to the interstitial cells. We do not fully sense the interrelation between the testes and the other endocrine glands particularly the adrenals, thymus, thyroid and the pituitary glands. Nor do we always know where to draw the line between sex activities due to the psychic processes and those due more largely to internal secretion.

We do know that the testicle does supply a hormone to the system that not only has to do with the development of secondary male sexual characteristics but also exercises a direct effect upon primary sex characteristics. Just how much hypofunction of the internal secretory apparatus can be compensated for by gland transplants, gland substance injections or like procedures is a grave question, insofar as sex performance is concerned. Surely these methods have not nearly the value their devotees would have us be-

lieve, and there is much reason to feel that their seeming good was more a psychic than a physiologic urge. So blatant have been the claims of some of those who have carried out these procedures, and so transient have been the results when there did seem to be any, that the entire subject has fallen into much discredit in the minds of many.

Fortunately, our knowledge of the spermatogenic function of the gonads stands upon a far more scientific foundation. It seems to be fairly well established that spermatogenesis in human beings does not often take place at body temperature. This is shown by the fact that gonads retained within the body, though they have an abundant blood supply, do not often generate spermatozoa, whereas, those in the scrotum do. This fact brings out the thermoregulatory function of the scrotum and accentuates the enormous importance to the human race of a structure so seemingly insignificant as the dartos muscle, for the relaxation and contraction of this muscle to the varying degrees of external temperature apparently serves to regulate the temperature as best suits spermatogenesis. We further know that unless cryptorchidism is corrected before puberty, spermatogenesis in the malposed organ is hardly likely to occur, nor is atrophy likely to be prevented. It can thus be seen upon what a slender thread even the beginning of human life hangs.

So far as is known, the epididymal tube and the vas deferens are conducting structures for the sperm elements. It is probable, however, that the secretory cells of these canals add something in bulk and, perhaps, a nutritive principle for these highly motile cells. At least it is probable that these fluids, through their reaction, do much to favor spermatozoal activity, as it has been shown that motility varies as varies the hydrogen-ion concentration of the surrounding medium.

The ampulla of the vas undoubtedly serves as a reservoir for spermatozoa, as does also the seminal vesicle. It should be noted that the spermatozoal storage in the seminal vesicles has been the subject of considerable discussion. It has been contended by many that the sperm cells do not enter the vesicle. One who has spent much time studying the fluid digitally expressed from these structures is hardly likely to subscribe to this contention, however. The finding of partially digested spermatozoa in the vesicular gel of those who have not recently emptied the vesicles, together with the fact that the distribution of sperm throughout the entire fluid expelled at orgasm is far too intimate to have occurred during its passage through the urethra, hardly supports the thought that spermatozoa do not enter the vesicle. Further, the anatomic and physiologic aspects of the question are in favor of vesicular storage. The ampulla empties into the seminal vesicle and not directly into the ejaculatory duct. Fluid injected into the vas deferens distends the seminal vesicle before even a small quantity of it finds its way into the ejaculatory duct.

The seminal vesicle unquestionably is a secretory organ. Likewise there is reason to believe that it has the power of digesting and absorbing spermatozoa for, though present in large numbers in the vesicular contents of the male who has frequent expulsions of the vesicular contents, the spermatozoa are far less in numbers in the contents of a seminal vesicle that has not been emptied for a long period of time. The contents of such a vesicle, when digitally emptied, presents microscopically a homogeneous gel in which usu-

ally can be seen a small number of spermatozoa in various stages of disintegration

In its passage through the urethra the vesicular content has its bulk further increased by the added prostatic secretion and the urethral fluids. Just what part these play in the general picture, so far as spermatozoal activity and fertility are concerned, is not known. It has been stated that the prostatic secretion contained a vitalizing principle causing sperm motility. This thought is somewhat negated by the fact that highly motile spermatozoa may be drawn from the epididymus where there has been no prostatic secretion admixture.

#### THE RELATION OF ANATOMIC STRUCTURE TO UROGENITAL INFECTION

It is probable that nowhere in the human body does there exist a more striking and a more fixed relationship between anatomic structure and the incidence and behavior of infection than is found in the urogenital tract. Our modern methods of diagnosis have brought this association so prominently into the foreground that he who does not sense it thoroughly is more likely to be a diagnostic blunderer than otherwise. And he who overlooks it in values of cause and effect will have a scant success in his therapeutic endeavors. So true is this that the larger share of modern urologic procedure has to do with the discovery and correction of changes from the normal position and contour of the various portions of the tract.

Reduced to its simplest terms, the matter is largely one of drainage possibilities. We have been rather slow to realize this fact and, as a result, have featured certain conditions as disease which in reality were merely the secondary evidences or symptoms of some acute or chronic infection elsewhere in the tract which often owed its origin, and more often its continuance, to poor drainage. To such an oversight is to be attributed the fact that for centuries cystitis was considered a disease of itself, and even today, pyelitis often is falsely accorded the same dignity. Indeed, there is a crying need for a general revision of the current ideas upon urogenital infection held by a large proportion of the medical profession. In it there is little realization of the underlying factors at play. Because of this, countless perfectly futile therapeutic endeavors are indulged in which add little glory to medicine and give scant relief to patients.

In tracing the relationship of anatomic structure to infection there should be in the mind certain things which clinical experience has given warrant for viewing as facts. Some of these, perhaps, belong more appropriately in other places but are so essential to an understanding of the question under discussion as to justify their inclusion here, even though they may be repeated elsewhere. To avoid much verbiage they will be given as direct, brief rules.

- 1 Practically all urogenital infections are of a pus producing nature.
- 2 The consideration of paramount importance in the presence of pus is good drainage.
- 3 All things being equal the better the drainage the better the curative response.
- 4 Chronicity of infection in the urogenital tract usually means poor drainage.
- 5 The conducting structures of the urogenital tract practically will not

hold a chronic infection in the presence of proper drainage, unless there is an infective feeder in some poorly draining contiguous organ.

6. Except with the gonococcus, acute, primary infections of the properly emptying conducting structures of this tract practically do not occur. Almost always there is a primary infection in the kidney, prostate gland, seminal vesicle, or some contiguous structure.

7. The curative powers of these conducting structures are of an order so high that they usually undergo spontaneous cure when feeding foci are removed and proper drainage is established.

8. The behavior of infection in solid organs, such as the kidneys, the prostate gland and the testes, depends upon the portion of the organ infected and the particular potentialities of the microorganism present. More particularly does its extent and duration depend upon drainage.

9. There is a definite difference between true mucous-membrane infection and mucosal irritation resulting from the infection of retained urine or chemical irritation.

With these thoughts in mind, one who views the urogenital tract in its entirety will see many anatomic possibilities for trouble. The parenchymal portions of the kidneys, prostate and testes offer no possibilities for the drainage of purulent products, wherefore, their infection generally leads to some degree of destruction. Infections of their minute mucous channels, because of their definitely limited drainage possibilities, should and do exhibit a marked trend toward prolonged duration. And such prolonged duration often furnishes for the larger conducting channels of the tract the infective feeder which continues their infective processes.

What is true of the smaller mucous channels of the above solid organs applies with considerable force to other small mucous channels in association with the main conducting structures of this system. As a rule, however, the mobility of these channels is such as to give them greater opportunity for drainage. The principle, however, is the same.

When the mind is turned to the larger channels and cavities of the tract, the influences of drainage interference are seen in greater numbers and, perhaps, with more clearness. It is here that a healthy skepticism toward the likelihood of primary infection stands the diagnostician in good stead. And he does well to believe in the existence of primary pyelitis, ureteritis and cystitis only when he has proved positively that there is not a bacterial feeder elsewhere and that the drainage of these structures is perfect. Disregard of this has been a prime factor in urologic diagnostic error.

It should be kept constantly in mind that there may be several factors in the causation of poor drainage of hollow organs. And one must not lose sight of other possibilities in the consideration of the more likely one of obstruction. Such organs depend also upon a proper neuromuscular balance for their proper emptying, and interference with this balance as definitely may promote stasis as does true departure from anatomic normal. In fact, one at times does well to take into consideration such seemingly remote factors as psychic interference.

It is thus obvious that any structural change of the urogenital tract, whether it be due to anomaly, pressure from contiguous structures, or anything that in any way interferes with its physiologic emptying function, may be the determining factor in the precipitation and duration of infec-

tion Developmental faults, such as congenital bands, malposition, aberrant blood vessels, too much constriction at normal points of narrowing, overdevelopment of sphincteric muscles, faulty enervation and the like, may predispose to infection and may prevent recovery until corrected

With so complicated a mechanism, the wonder is that Nature so commonly stays within the limits of what we call normal And, considering the position of the various portions of the tract in relation to other structures, together with the pathologic lesions of a noninfective sort to which it is subjected, it is not surprising that infections of it are of such frequent occurrence

#### THE RELATION OF SURFACE HISTOLOGY TO UROGENITAL INFECTION

It requires little observation to discern that the several types of surface epithelium found in the various portions of the urogenital tract present differing degrees of susceptibility to bacterial infection Not only do they differ in this respect, but they exhibit a similar difference in the speed with which they recover when infection does take place So true is this with gonococcal infections that it is possible to lay down some rather helpful rules in this regard, rules which are particularly valuable to us

In a consideration of the subject, however, one should have in mind the tardiness with which changes of type occur as the result of long standing irritation to the epithelium of the tract On the one hand, we see columnar surfaces changing to the more highly protective squamous cells and, on the other, comparatively immune surfaces rendered susceptible by similar irritative influences So common is this as to limit the application of our near-rules to the cells normal to the part

One may use as a working basis for surface-infection incidence in normal, unchanged mucosa the following rather safe rules

1 Squamous covered mucous membranes show marked resistance to infection and unless subjected to constant irritative influences, they exhibit a ready curative response if infection does take place

2 To a lesser degree the same applies to transitional epithelial surfaces covering freely dilating structures such as the kidney pelves, ureters and bladder

3 Transitional epithelial surfaces that are firmly fixed to their subjacent structures are highly susceptible to bacterial infection but show little tendency toward chronicity

4 Columnar surfaces are even more susceptible and, when infected, have much more difficulty in eradicating their infection

5 All types of epithelial surfaces have a greatly reduced resistance to infection when subjected to irritative surface influences

6 Such irritative surface influences may be due to (a) the discharge from poorly draining infective foci, (b) bacterial growth in retained urine, (c) chemical irritation, (d) urinary crystals and calculi, (e) foreign bodies or (f) direct trauma

Starting, then, in the upper reaches of the tract and passing downward, we find good bacterial resistance in the kidney pelves, ureters and bladder under normal conditions The trigone shows considerably less resistance as does also the posterior urethra In the latter, recovery often is retarded by poor drainage by virtue of its position between two sphincters

and the irritation resulting from feeding foci in the prostate gland. In the columnar-lined anterior urethra we encounter far less resistance to infection and a greatly lessened power of recovery when infection does take place. We find good drainage but much influence from feeding foci from the posterior urethra or above as well as from its own smaller mucous channels. The fossa navicularis, lined with squamous epithelium, shows a pronounced lack of susceptibility to infection and striking curative responses if infected.

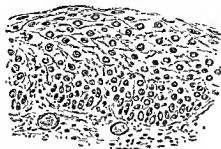


Fig. 66.—Squamous epithelium. This type of mucous membrane usually lines the fossa navicularis and, rarely, the membranous urethra. Owing to the inability of the gonococcus to penetrate between the superficial layers of cells it is practically immune to gonococcal infection.

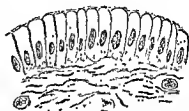


Fig. 67.—Columnar epithelium. This type of mucous membrane or modifications of it line the penile and bulbar urethra and all of the smaller mucous channels emptying into any portion of the urethra. The gonococcus easily finds its way through its intercellular spaces into its submucosa. It is the most susceptible type of membrane.

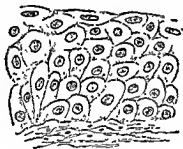


Fig. 68.



Fig. 69.

Figs. 68, 69.—Transitional epithelium. This type of cell lines the entire major tract above the membranous urethra. It exhibits varying degrees of susceptibility in different regions. In the kidney pelves and ureters it appears to have much native resistance. In the bladder, where it dilates until it becomes almost squamous in type, as in Fig. 69, it is practically immune unless changed by urinary retention or trauma.

The conditions holding in the smaller mucous channels in the urethral wall accord well with those of the columnar surfaces of the urethra, with the added limiting influence of their poorer drainage. It is a fortunate circumstance that the longer of these smaller-calibered channels rarely are infected for long distances through continuity of surface. Usually their infection depends upon the forcing of infection into them by back pressure from one cause or another. When infected, however, they show a prompt and efficient curative response.

Viewed in another way, with great truth one might say that the infectivity of any urogenital mucous membrane bears a direct relation to the



protoplasmic activity of the cells covering it. In other words, the more active the cells, the more easily infected is the surface they cover and the less readily does it eradicate such infection.

Turning our thoughts to other than gonococcal infections we see a remarkable degree of resistance to surface infection offered by the various expanses of mucous membrane of the tract, together with an almost equally striking degree of curative response upon the removal of precipitating factors. So true is that that we have grown to think of these surfaces as the

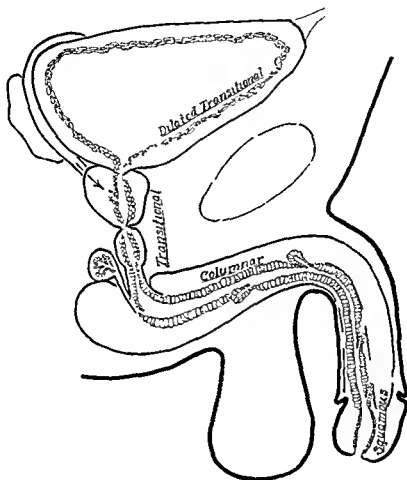


Fig 70.—Diagram to illustrate the locations of the various types of mucous membrane in the male urogenital tract. All of the channels leading from the main tract are lined by columnar cells.

secondary victims, rather than as the initial sites of infection. In the presence of perfect drainage and the absence of an infective feeder in some other structure they rarely become infected. Subject them to poor drainage with infection of the retained products, be they urine or pus, traumatize them with chemicals or foreign bodies, or subject them to infective feeders in associated structures, and the entire picture is changed. Remove these factors and, almost without treatment, the surfaces revert to normal, providing they have not continued to the point of fixed chronicity. Primary uncomplicated pyelitis, ureteritis and cystitis almost do not exist.

Even as we come to the urethra we find that much the same conditions hold. For, though the anterior urethra more often develops a primary infection, it rarely holds such an infection for any great length of time in the absence of a deeper-lying feeder or chemical irritation. Here, again, there usually are discoverable primary factors that have served to make mucosal infection possible and their removal will usually produce cure in the absence of local treatment.

Primary infection of the posterior urethra is as rare as such infections above this point. One does well, in the absence of gonorrhea, as previously has been stated, to doubt the possibility of any infection of any urogenital mucous membrane being primary. Such an attitude urges a thorough search

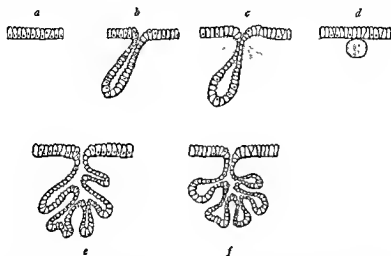


Fig. 71.—Diagram to illustrate the influences of drainage upon curative response. *a*, Good drainage and good curative response. *b*, Curative response of free mucosa depends upon gland drainage. If this is good, curative response in both is good but slower than *a*. *c*, Infiltration around the gland opening causes intermittent drainage and chronicity of infection. *d*, If completely occluded, lytic sterilization occurs and the gland ceases to be a further factor in the disease. *e*, Compound tubular glands such as the prostate are slow in recovering and drainage often must be encouraged by digital stripping. *f*, Compound racemose glands usually abscess when infected. If they do not it usually is necessary to encourage drainage by digital stripping or to excise them. (Cowper's and Bartholin's glands.)

for the precipitating factors upon the removal of which cure so largely depends.

Even in tuberculosis the mucous membrane of the urinary conducting structures never are primarily infected. These occur as the result of infection of either the kidney or genital system. To infection from such causes the urethral mucous membrane is singularly immune. Tuberculous infection of the posterior urethra is exceedingly rare. In the anterior urethra, such infection almost reaches the vanishing point.

Bilharzial infestation seemingly reverses this condition, for in it the primary urogenital infection is almost always in the bladder wall at the site of the ruptured egg-bearing tubercles. It, however, is not a tissue-surface disease. The eggs are laid in the submucosa and involve the surface simply because it is easier to grow in that direction than it is toward the deeper muscular layer.

## CHAPTER II

### HISTORY-TAKING, EXAMINATION OF THE PATIENT AND OFFICE LABORATORY PROCEDURES

#### HISTORY-TAKING

In no branch of medicine is more tact and judgment required in the taking of a history than is the case with urologic patients. Just so soon as trouble strikes the urogenital tract do we begin to see how closely is the tract tied up with the individual's psychologic processes. Should the trouble be of either a sexual or a venereal nature this association is greatly magnified. And should there be a long racial background of religious accentuation of the home and the having of children, as with the Jewish race, the urogenital disability is likely to dominate the mental processes almost to the point of a true psychosis. Many such individuals are truly soul sick. True, in those beyond the age of forty who are not sexual or venereal cases, there is not such a prominent psychic background, but frequently there is an apprehensive state that makes history taking almost as difficult.

With such an element of the almost psychoneurotic in the immediate foreground in so many cases, one readily can sense the need for placing the patient as nearly at mental ease as possible at the start of the history-taking. Not much can be accomplished otherwise. One rarely seeks his minister as an individual to listen to the pouring out of his heart regarding a 'venereal' disease, nor does he tell of his sexual disabilities to one seemingly too high minded to realize that sex is quite an important factor in human relations. A puritanic holier than thou mien on the part of the physician is the surest way to rob urologic histories of what often are their most important points. Kindred souls, either real or seeming, converse more freely, and he who temporarily places himself nearest the patient's mental and moral level gets the best history.

Patients' symptoms are to the urologist the signposts that often point the direction for study. However, the little things frequently are of greater importance than those which occupy most of the patient's attention. Thus, it is of the utmost importance to start history taking in a deliberate fashion wherein the appearance of hurry is not in evidence. One never should lose sight of the fact that the most important patient contact is the first one. And the physician is wise if he lets the patient do most of the talking during the history taking.

After getting the preliminary data belonging to every history, such as name, address, age and marital state, it is a good plan to have the patient start at the beginning and recite his symptoms and experiences in his own way without being guided unduly. The general impression that such a method is far too time consuming is not borne out by experience in most cases. If the history covers any great length of time one is likely to find that the patient makes a good start and a good finish but grows very sketchy

about the intervening period. He more often has to slow the patient down in his recital than to speed him up.

If, as sometimes happens, a patient is entirely too verbose and cannot stick to the narrative, a question here and there that needs a direct answer usually will bring him back to the main line. The highly neurotic patient frequently brings in a written list of his real and fancied symptoms and, of all, he is the most difficult to keep from needless wasting of time. He is rather determined to tell the whole story and often resents too much effort on the part of the physician to shorten the recital. Despite this set-up, by the use of much tact, one can cut short much of the needless recital and certainly can learn much about the patient's mental workings. Often he can convince the patient of the extent to which worry and self-analysis have dominated his life picture and how greatly they have magnified things of a trivial nature. No lesson can be of more value to the psychoneurotic and, if kindly and tactfully done, it frequently will be the means of helping the patient recover his sense of proportion, a thing for which his family or associates will be eternally grateful.

Aside from developing a lucid description of the symptoms, their sequence and type, the history-taker should be equally interested in discovering the extent to which they have warped the patient's mental outlook. So much of office urology has to do with mental fixations of one type or another that he who would do most for his patient needs to know what the patient's mind is doing. Psychogenic urologic symptoms are of such common occurrence that they must be understood if one is to avoid much diagnostic error and an endless amount of inefficient local treatment for things not due to local causes.

Above all things, the urologist should not try to guide his patient's answers too much. He should always remember that urologic maladies, like troubles, often have company, and that no other symptom groups more often mislead. By directing the attention of the patient along one line his story has suggested, symptoms caused by far graver lesions easily may be overlooked.

No matter what the trouble is, a history should contain a record of previous attacks, their severity and duration, and the treatment efforts that have been carried out to relieve them. There should be developed a clear story of the presence or absence of urethral discharge; changes in urinary function, such as, frequency, urgency, difficulty in starting the urinary stream, the character of the urine passed, whether cloudy or bloody, and pain, its character and its relation to urination and points of transference. Not that he would make a diagnosis from them, but that he must find, through the studies they indicate, the reasons for them.

One should combat carefully the common tendency to forget that he is dealing with an individual in whom the urogenital system is but a part. To think of patients solely as urogenital systems around which God draped a few other functioning structures is to travel an extremely narrow road and to miss much in the way of trouble that belongs in that stage-setting around a tract that has captured his fancy and fills his dreams. This tendency toward a narrowing of the visual field, as previously has been said, is more common in those who have specialized in urology without having had some

years of general practice, and they should be constantly on the alert lest it reflect itself in an inordinately wide margin of diagnostic error.

Of all urogenital departures from normal it probably is hardest to get a clear history from those individuals afflicted with some change in *sexual function*. It is a simple matter to get the patient to say what he cannot do but that only starts the search. The discovery of the phobias and mental fixations underlying his disability usually requires considerable time and tactful questioning. Above all things it requires a patient put at mental ease by the knowledge that the physician is neither curious nor unsympathetic but is asking the questions solely because he must know the answers if he would help the patient to overcome his difficulties. Such patients are quick to discover any lack of sympathy with their troubles. They want no one to sit in judgment upon them. They are heart sick and low and are eternally grateful to the physician who is patient with them and helps them. In developing such a history one does well to question most closely about the sentimental factors that were at play when the disability was first in evidence. This is readily done if the patient is impressed with the fact that the key to the situation usually rests in some minor circumstance of environment or psychologic set up. Aside from this, it is well to go even further back and discover just what was the patient's previous normal of accomplishment, for such a knowledge often must serve as a standard for him. One rarely can take a patient who has been weak in this respect and advance him further than his former best—a fact whose recognition should prevent the building up for him of false and impossible standards of accomplishment.

The form upon which a history is recorded often is a matter of considerable importance in institution work if uniformity is to be encouraged. Unquestionably it is of great value to the beginner in urology to use a form on which almost everything that one might find out about a patient is called for. In such a way habits are formed in history taking that are of great value. However as one grows more and more familiar with the taking of urologic histories he develops the habit of failing to record his negative data and considering that things not noted were not present. Thus, he does not feel the further need of complicated history forms and many of our leading urologists have almost reached the stage where they use a blank sheet at the start. Most of them have started with 3- by 5 inch cards and gradually reached full letter size (8½ by 11 inches). Their filing cabinets are assortments of different sized drawers and most of them wish they had started with the larger size instead of gradually working up to it. Hence, it is better for the beginner to start with that size rather than let smaller cards engender the habit of too much brevity.

Upon a number of occasions the writer has been consulted by physicians regarding the type card best suited to their requirements. Usually he found that they had started with small ones and were dissatisfied with them because often several had to be used and the clips holding them together were unwieldy in the file and did not always insure against separation. One who has started with a 3 by 5 card finds these difficulties very real ones and that there is little he can do about it. Several who were using the 8 by 5 card overcame their difficulty by using heavy paper (8 by 10 inches) and folding it so that the fold was uppermost in the file. Where more than one was needed for a history the second was placed inside the first when filed.

## EXAMINATION OF THE PATIENT

By the time one has finished taking a urologic history he has obtained a good general idea of the studies necessary for a diagnosis. It, however, is well to have a routine method of carrying out the first steps in the studying of every urologic case, for the histories of patients are not always to be relied upon in all particulars. Most of the patients reaching the urologist are referred by those better able to carry out ordinary physical examinations than himself. For this reason, it often is best to let the referring physician answer the questions about the heart, lungs and other vital organs. Such a procedure makes for better teamwork between the urologist and the practitioner and overcomes the thought that the former may not be confining himself to his specialty. Many physicians resent a lack of such cooperation and their experiences have made them loath to refer cases, a condition that is worth much effort to correct. Realizing, then, that many urologic conditions are but a part of some distant departure from normal, let us here confine ourselves to the strictly urologic aspects of patient study.

Wherever possible, it is wise to do such an examination at least an hour after the last urination. Particularly is this true in the study of infections of the lower portions of the tract. A patient who has just urinated may have washed away the evidence upon which a diagnosis must rest.

The genitalia should be exposed and any secretion that can be expressed from the urethra should be placed upon a glass slide for later microscopic study. If the discharge is moderately profuse and mucoid in character it is wise to make two slides, one for staining and one for study in the fresh condition under a cover slip for the discovery of the *Trichomonas vaginalis* if present.

After this the prepuce, glans penis and shaft of the penis should be inspected and carefully palpated. The scrotal contents, then, should be examined and note made of any abnormalities in the size, position and mobility of the testes, epididymes and spermatic cord. The inguinal rings should be palpated for real or incipient hernia and an effort should be made to feel the inguinal lymph nodes.

Having studied the external genitalia and the urethral smear, the urologist should instruct the patient to pass his urine into two glasses, being careful to pass sufficient in the first glass to flush the urethra thoroughly. From the character of the voided urine it is often possible to plan the further studies needed. If the second glass of urine contains no pus and the first glass does, it is safe to conclude that the inflammatory process is distal to the vesical outlet, except in the extremely rare case of ureteral block. If, on the other hand, both glasses of urine contain pus the problem, in other than gonorrhea, is not such a simple one and may need much upper tract study.

If there is no pus in the urine, but blood is present, one is not fair to the patient if he stops his study before the source and cause of the bleeding is determined. It matters not what the character of the bleeding is or from whence the other symptoms may suggest that it comes, the examiner has no moral right to jump to diagnostic conclusions. Many lives have been sacrificed needlessly by such methods.

Should pain be a factor, it is best to be even more wary about hasty con-

elusions Urogenital pains are such misleading things that they are not to be relied upon too implicitly The pain so seldom is at the site of the lesion causing it as to be an invitation to error Also, psychogenic pain may mimic the pains of almost any urogenital lesion Here, the x ray and the cystoscope are urgently called for unless there are contraindications to the latter

In every urogenital study the prostate gland and seminal vesicles should be palpated Whether their secretions should be obtained for study depends entirely upon the possible contraindications to prostatic massage In the presence of acute posterior gonorrheal infection it is definitely a menace and in the ocular and cardiac manifestations of focal infective absorption it may be even more hazardous

The abdomen should be inspected and palpated and an effort should be made to palpate the kidneys Even here one should avoid being misled by what he feels, as will be pointed out under the heading of Palpation The suprapubic region should be palpated carefully and percussed for possible urinary retention

From a careful appraisal of the data thus obtained one is usually in a position to map out what studies are needed to answer the problems in those cases that remain unsolved Most of these further studies are of the more deliberate sort and call for roentgenograms of one type or another, cystoscopy, renal function tests and the like, all of which are considered at length under their appropriate headings

It is a wise plan to avoid the carrying out of too many diagnostic procedures at a single study, particularly in markedly neurotic and definitely ill patients Each procedure should be viewed from the standpoint of its possible reactions and, if the possibilities are great, care should be taken to avoid them or so to space the procedures as to reduce the dangers to a minimum Neither the patient nor his physician is greatly impressed by a series of studies that drives a moderately comfortable ambulatory patient to a bed of pain Most of the procedures that bring this about are of an instrumental nature and their rather common occurrence should make one cautious about the too frequent and unjustified use of instruments Of particular importance in this regard is the passage of sounds and catheters into the urethra of the weak or aged and such measures should be resorted to only when there are definite indications for them that appreciably outweigh their dangerous possibilities

By a judicious use of the various methods of preliminary procedures in patient study one rarely makes the patient worse than he was at the beginning of the study If on the other hand, he disregards contraindications to certain procedures he does much to discredit the art of urologic study, often he frightens patients so that future studies are refused Should he carefully study the urethral discharge, if any, the sediment of the first and second glasses of urine, and the prostatic secretion, if it be safely obtainable he readily can separate those patients presenting a pyuria who need cystoscopy from those who do not If he watches the size of the urinary stream he quickly can distinguish those patients who should be tested for possible urethral stricture from those who do not need such urethral instrumentation If he finds the gonococcus in either the urethral discharge or urinary sediment or the patient gives a history of recent gonococcal infection he knows that urethral instrumentation is a menace

## OFFICE LABORATORY PROCEDURES AND MICROSCOPIC INTERPRETATION

## THE STUDY OF THE URINE

The urologist who must rely upon a more or less distant laboratory for the simpler laboratory studies of his patient's urine is laboring under a great disadvantage. Likewise, he is placing upon his patient what often is a painful burden of anxiety by the delays thus occasioned. Nothing is of greater importance in the study of urologic cases than that the one making the clinical study have an opportunity of seeing the entire laboratory picture. This cannot be done if he is to rely upon some laboratory technician's interpretation of what he or she sees through the microscope. Urologic microscopy is a thing aside from that of general urinary studies as indulged in by the internist. For his purposes a stale urine may do, but the real diagnosis of lesions of the various portions of the urogenital tract often hangs on too slender a thread for the careful urologist to place value in studies of other than a freshly voided urine.

The general tendency to be willing to place absolute credence in the reports of laboratories is to be deplored. Not because the laboratory workers are not sufficiently skilled in their wide range of work, but because they rarely have a special understanding of what the urologist really wants. Urinary changes take place so quickly as to deny them the opportunity of finding things that were present in the urine at the moment of voiding. And upon just those things that have disappeared in the aging of the specimen may rest the key that leads to a discovery of what really ails the patient. It would be possible to cite many cases wherein the urologist was prevented from making a correct diagnosis through the erroneous interpretation of the laboratory upon which he placed his dependence.

Two objections that constantly are raised regarding the carrying out of one's simpler laboratory tests are that they require more time than can be spared for them and that they require too much equipment. The first has no weight and the second is an equally poor reason. It is probable that the real reason is that laboratory procedures do not appeal to the majority of physicians and, rather than stimulate an interest in them, they are willing to follow the course of least resistance by letting the laboratory do the work. There would be some excuse for this attitude if the studies really required were either time-consuming or difficult.

With a little practice by the urologist, the average urinalysis need consume no more than ten minutes and it takes but a short time to build up a fund of knowledge regarding microscopic findings that makes for both speed and accuracy. The amount of equipment required is ridiculously small and the expense ridiculously meager in comparison with what it all means to the physician and his patients.

So far as equipment is concerned, one needs first a microscope with an oil-immersion lens, a centrifuge, centrifuge tubes, test tubes, a bunsen burner or alcohol lamp, microscope slides, coverslips, a few reagents, stains, a wash bottle and dish, a few pipettes, and a wire loop. And with so meager an outfit he is equipped for most of the urinary studies that will be demanded (Fig. 72).

What of the simplicity of the procedures involved? The patient presents himself with some urinary disturbance either objective or subjective.



From a urologic standpoint, the first important single thing to settle is just which microscopic elements are in the urine. Because it has much value as a localizing test, we have the patient void into two glasses and we compare their appearances. We place a small quantity of each in centrifuge tubes and, while the sediment is being thrown down, we determine the specific gravity, the reaction and the presence or absence of albumin and sugar. By this time the sediment is deposited and with pipettes we place a small amount of sediment from each tube on slides, overlay them with coverslips, cut down the illumination of the microscope so that transparent objects may be seen and, in a moment or two, we are through.

If we find pus in the first glass and not in the second, we know that it came from some place distal to the vesical outlet and we know that we do

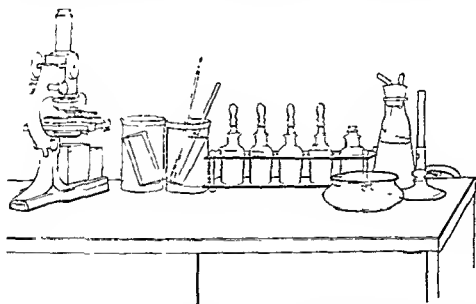


Fig. 72.—Metal storage cabinet (18 X 36 X 36 inches) with glass top on which are the microscope, jars for clean and used slides, a platinum loop, a glass pipette, a stand containing solutions for Gram stains and immersion oil, a wash bottle and dish and a bunsen burner. With this small outfit and a centrifuge most of the simple laboratory procedures in office urology can be carried out.

not have to worry much about the bladder and upper portion of the urinary tract so far as infection is concerned. If we find pus in both sediments we know that some of it came from the bladder or above, or from some pus pocket between the vesical outlet and the anterior extremity of the bulbar portion of the urethra and that much more study is necessary. The nature of this may be suggested by other elements in the urine or by the symptoms. For instance, should one find triple phosphate crystals in the freshly voided urine he would know that there was urinary stagnation and, if he proved that the patient really emptied the bladder, his mind immediately would turn to kidney pelvis stagnation and the necessity for x-ray and other studies.

Should the second urine contain much squamous epithelium there would be no doubt about the existence of chronic cystitis, but, as cystitis almost always is a symptom and not a disease, there would arise the necessity of

finding the true cause. Should he find many motile bacilli in an otherwise negative urine, his mind would turn immediately to the condition of the colon as the possible source of the bacteria. But if he found large clumps of cocci with or without pus he could feel sure that the most careful studies of the emptying possibilities of the kidney pelves should be investigated. Probably he would find a decidedly displaced kidney with a dilated pelvis and ureter. In any event he would feel it wise to study a stained specimen of the urinary sediment.

Perhaps the patient complains of a frequency of urination, passes a clear urine in which the physician finds the envelope crystals of calcium oxalate. That is not all he should find, for somewhere in such a urine are some red blood-cells. On general principles he would think of stone and of the x-ray but, if that revealed none, he would not of necessity suspect its negative findings, for calcium oxalate stones are so dense that they rarely are overlooked in x-ray films. He would do well to ask the patient how he was enjoying the grapefruit or just how generously he was consuming rhubarb, tomatoes, apples, carbohydrates or the like. If this failed to reveal such a dietary cause, one would know he probably was dealing with a constipated patient. It might, however, be well to make a note that the patient should have another x-ray search for stone in two or three months.

Perhaps there is some blood in the first glass of urine and none in the second—unusual, but it does happen and it comes from a point distal to the vesical outlet. Or, we find it in the second glass and not in the first and we know that it comes from some portion of the tract that is subjected to muscle action. If we had been watching as the patient voided we would have seen that it was the last thing emitted, and could have seen it filter down through the second glass of urine. We must not be too sure that we are safe in following the old dictum that "terminal bleeding" is due to pathology at the vesical outlet. Usually it is, but it also occurs at times as the result of vesical papilloma, carcinoma, ulceration or stone, all of which require cystoscopic study. If we find blood in both glasses such a study is even more imperative and it is best done while the patient is still bleeding. It is much easier to trace it then if it comes from one or both kidneys and not the bladder. We should, however, give the utmost respect to contra-indications to cystoscopy.

Perhaps we find a number of yeast cells in the first glass of urine. We know that yeast cells should not be found in the genitalia in quantities, as a rule, unless there is sugar in the urine. And, if we get a negative test for sugar, we do well to suspect the reagent we are using.

All of these things, if present, can be discovered in a few moments at the microscope. By such simple and quick studies we have been able to answer a number of extremely important diagnostic questions. While the patient still is present we have found those things that so commonly point in the proper direction for further necessary studies. We have done much for the patient's attitude, for the knowledge that he is really getting a careful diagnostic study is of great comfort to him. We have raised his respect for the practice of medicine, a thing that was never more needed than it is today.

While the internist often must place much value upon quantitative tests of the various constituents of the urine, such studies are seldom of so great

importance to the urologist in his routine office studies. His office work has more to do with infections of the urinary tract wherein microscopy generally holds a greater value than do chemical investigations of the urine. When these latter do assume great value most of the cases are of an operative sort wherein blood chemistry is equally as important as is quantitative urinalysis, and it is here that the better equipped laboratory is essential and usually to be relied upon implicitly. This reliability is a great good fortune, for quantitative studies of both blood and urinary constituents are usually difficult and time consuming. Generally they require that special skill and knowledge found in the trained laboratory worker with a familiarity born of the repeated doing of the more intricate things. It is here that the field divides and, unless the physician has had much laboratory experience or has a special *flair* for the work, he does best if he considers such studies as belonging to the special field of others. For this reason, no effort will be made here to enter into that field. It is of more value to adhere to those simpler things of a practical nature, a knowledge of which is essential for the safe interpretation of the more ready urinary studies.

To court accuracy in the macroscopic observation of the freshly voided urine one must of necessity have in mind a visualization of the various divisions of the urogenital tract as they relate to the mechanics of urination and as they influence the difference of appearance between the urines in the first, second and, perhaps, third portions voided. Also, he must bear in mind those things that change the appearance of the urine as a whole, such as phosphates, urates, bacteria, mucus, and ingested substances. He must know how to eliminate them as sources of error in his visual interpretation. Above all things he should not grow too conceited about his ability to arrive always at a safe opinion without the use of the microscope. No matter how great his experience, often this will prove him in error when he is most sure that he is right.

**The Two-glass Test**—Except, perhaps, during times of a reduction of urinary acidity sufficient to cause a throwing out of solution of some of the contained phosphates, and the far rarer urate showers, the normal kidney urine is clear and crystalline. It may vary markedly in shade, but it is never turbid. The products of inflammatory processes along the conducting structures are frequently suspended in the urine as voided and reduce its crystalline appearance to a degree dependent upon the amount and nature of these substances carried away in this fluid. Not only does this occur with pus but it also occurs as the result of any bleeding along the tract, and occasionally as the result of epithelial desquamation. This visible change in the voided urine has made possible those extremely useful diagnostic procedures generally known as the two- or three glass tests.

So great was the value of the two glass test that clinicians diligently sought to add to its usefulness and gradually, glass after glass was added until some talked of seven-, eight and nine glass tests. The use of the microscope soon showed the *futility* of such elaborate procedures with the poor guesswork that they encouraged, and it is seldom now that one goes beyond a third glass of urine in his diagnostic work unless, perchance he has no microscope. Even then, his margin of error will be about even with his accuracy, hardly better. Such a margin of probable error obvi-

ously has no place in a diagnostic art whose accuracy can be second to that of no other branch of medicine.

Aside from the question of urinary turbidity, these tests are used as ready indicators of the source of the pus or blood. For the structure of the urinary tract is such that the sphincter at the vesical outlet, and particularly the cut-off muscle, tends to prevent fluid in the urethra from finding its way back into the bladder. The latter sphincter is an absolute barrier against the backward flow of fluid in the anterior urethra, whereas, that at the vesical outlet does allow fluid in the posterior urethra to find its way backward into the bladder when that portion of the canal is filled.

The value of this simple method of localization has been most apparent to those who have treated gonorrhea. It, however, has almost as great a value in the determination of the source of pus and blood from the urinary tract and should be in more general clinical use than is the case. This fact has been pointed out elsewhere and need not be elaborated upon here.

As with many of our simpler diagnostic methods, there is considerable confusion regarding the interpretation of its findings. This confusion is brought about by an effort to remember what is the significance of the various urinary pictures presented rather than to analyze them from a physicoanatomic basis. Such confusion is most in evidence regarding the use of the test in following the clinical course of gonorrhea. And it is here that one encounters his greatest difficulty in the teaching of students who so readily mistake memory for reasoning. The matter seems so utterly simple when under discussion that, like many simple things of the sort, it fails to elicit the proper amount of attention to assure its being understood and remembered.

As has been intimated, the test is based upon the fact, that, given a clear bladder urine, any pus or blood in the urethra will be found in the first voided urine, and, if that is passed into a beaker, it will differ in appearance from the urine voided later into another glass. In other words, the first glass will not be crystalline and the second glass will, providing sufficient urine was passed into the first glass to cleanse the urethra thoroughly.

If, on the other hand, the bladder urine is not clear, both glasses will show a reduction of their crystalline appearance. Consequently, in the presence of a cloudy bladder urine, except in a known acute anteroposterior urethritis, the glass test is not of the utmost localizing value. For it does not tell us whether the substance that has "soiled" the urine came from the upper urinary tract, the bladder or some contiguous structure.

In the presence of known posterior urethritis a single test often is not very illuminating. For, unless it has been preceded by glass tests that showed the second glass of urine formerly was clear, one is not always safe in assuming that there does not also exist some bladder or upper tract source of contamination when both glasses of urine are "soiled." Also, for anatomic reasons, one cannot assume that these sources of contamination are absent when both glasses fail to be crystalline. Pus or blood escaping into the posterior urethra, if sufficient in bulk to distend that portion of the canal, will force its way backward into the bladder and cloud the bladder urine, though no bladder infection or bleeding is present.

It will thus be seen that the test of itself is not absolute but must be con-

sidered in conjunction with the rest of the clinical findings as well as the history of the case in hand. Further, there are some precautions that must be carried out in order to avoid urinary pictures that deceive.

Unless at least two ounces of urine are voided into the first glass one should not feel too much assurance regarding the thorough cleansing of the urethra. Under such circumstances, a later study should be made if there is the slightest *soiling* of the second glass. Further, if the prepuce is present it should be retracted during urination, for not a few individuals have the habit of ballooning the preputial sac with urine by digitally holding the preputial meatus and thus are prone to pass into the second glass of urine a residuum of contamination from the sac.

The one positive value of the two glass test is that any pus found in the first glass and not in the second comes from a point distal to the vesical outlet. This does not of necessity say that it comes from the anterior urethra alone, for it must be remembered that posterior urethral pus passes backward into the bladder only if there is a sufficient quantity of it between urinations to distend that portion of the canal and force the sphincter at the vesical outlet.

One cannot apply this rule too dogmatically to the question of blood. Urethral bleeding may soil the first glass considerably and the second urine may gather sufficient blood during the passage through the canal to be macroscopically obvious. If there is but little urine in the second glass and the act of urination has increased the bleeding, there may be little difference between the appearances of the two glasses.

The first glass of urine may be crystalline and the second far from it, a urinary picture likely to lead to faulty diagnosis, particularly if the clouding medium be blood. Error is likely to creep in here through the general opinion that blood in the second glass and a clear first glass of urine is indicative of congestive bleeding from the vesical outlet because of sphincteric contraction at the end of urination. This, of course, is the most common point of origin of such blood but, as has been said, carcinoma, ulceration or papilloma of the posterior bladder wall at times gives the same symptom. Upon rare occasions vesical calculus causes a like 'terminal' hematuria.

If the clouding medium in the second glass of the above urinary picture is pus, it is due to the emptying of some pus pockets in the prostate or the bulbar portion of the urethra as the result of muscular pressure. If it be mucus and phosphates it is almost pathognomonic of a small amount of residual urine in an individual with a mild degree of vesical outlet obstruction from either median commissure hypertrophy, fibrous bar or carcinoma of the prostate. This symptom is seen in these patients only on a urination following a seated posture for some time, which has allowed the mucus and phosphates to settle to the base of the bladder. It never is seen when urination has followed physical activity. At times this urinary picture is due to the expulsion of semen at the end of urination.

In gonococcal infections the two glass test has positive significance only during the period of urethral suppuration. The clearing of the urine in this disease is in the absence of astringent injections rather a safe sign that the immunity processes are being well established. But in no sense does it prove nor even strongly suggest cure. The prostate and some of the other smaller glandular structures in association with the urethra may be and commonly

are, grossly infected in the presence of a crystalline urine in both glasses. From the clearing of the urine on, in this disease the test is carried out more as an assurance that things are progressing favorably, as faults in patient conduct or injudicious treatment efforts usually will cloud the urinary picture so long as the gonococcus remains. A common exception to this, however, is to be seen in those patients favorably influenced by sulfanilamide.

The three-glass test in offices where microscopy is done as a routine procedure is practically limited to those individuals who present themselves for the first time with a soiled first and a clear second glass of urine some weeks after the onset of gonorrhea. In them, the question of possible posterior urethral infection arises. Often, there is nothing in the recital of symptoms to suggest such disease extension. Asymptomatic posterior infections are far too common to warrant one in placing too much value upon histories alone. In such a patient it is well at the next visit gently but thoroughly to wash out the anterior urethra and then have the patient pass urine in two glasses. Urethral washings may be considered the first glass, the first glass of voided urine would be the second glass and would contain any pus flushed from the posterior urethra by the urine, and the last glass would demonstrate the condition of the bladder urine. Late in the disease, when prostatic massage for the collection of prostatic secretion for microscopic study held no hazard for the patient, this test would be needless and far less accurate. But, at a time when there would be a subacute gonorrheal prostatitis, which would contraindicate massage, the three-glass test has distinct value.

The method of using a greater number of glasses applies only to the later stages when it is possible to carry out prostatic and vesicular stripping safely. Judging of the source and presence of infection in structures giving opaque secretions merely by the extent to which these fluids cloud the beaker of water into which they are allowed to drop is no better than poor guesswork. The microscope renders them useless. Those tests wherein catheters are used for the multiple-glass test have less to recommend them. In the presence of gonococcal infections catheters are potent complication precipitators. The information thus gained often is fallacious. It is more safely and scientifically obtained by other methods.

Following is presented a brief tabulation of the import of the most usual urinary pictures encountered in urologic office practice.

| <i>First Glass</i> | <i>Second Glass</i>  |
|--------------------|--|
| Cloudy             | Clear: (a) Acute anterior urethritis.<br>(b) Acute anterior urethritis with mild or subsiding posterior involvement.   |
| Hazy               | Clear: (a) Mild acute or subacute anterior urethritis.<br>(b) Mild acute or subacute anterior urethritis with mild posterior involvement.<br>(c) Epithelial desquamation from overtreatment or stricture.  |
| Shreds             | Clear: (a) Subsiding anterior urethritis.<br>(b) Subsiding anteroposterior urethritis.<br>(c) Chronic urethritis, generally as the result of deeper foci of infection in the prostate or other associated small channels.<br>(d) Urethral irritation from overtreatment. |

| <i>First Glass</i> | <i>Second Glass</i> |  |
|--------------------|---------------------|--|
| Cloudy             | Cloudy              | (a) Acute anteroposterior urethritis<br>(b) Cystitis or upper tract suppuration  |
| Cloudy             | Hazy                | Subacute or mild anteroposterior urethritis  |
| Hazy               | Hazy                | (a) Subacute or mild anteroposterior urethritis<br>(b) Bacteriuria   |
| Clear              | Cloudy              | (a) Seminal fluid<br>(b) Contents of pus pocket<br>(c) Sedimented mucus or phosphates from a poorly emptying bladder<br>(d) Slight terminal bleeding |

Before passing judgment upon a hazy or cloudy urine it is well to rule out soiling due to separated phosphates by the addition of dilute acetic acid. The occasions are rare, indeed, in which the urine must be boiled to clear up a cloudiness due to separated urates.

**Color of the Urine**—The color of the normal urine depends largely upon its concentration. It varies from the clear, colorless fluid of polyuria to the deep yellow of a highly concentrated urine. Even highly concentrated urine, however, is of a crystalline clearness and any departure from this clearness is due either to urinary salts thrown out of the solution, ingested foods, chemicals or the presence of pathologic products, and requires investigation.

In these days of seeming color madness wherein one would think that the value of a drug as a urinary antiseptic depended solely upon its power of beautifully coloring the urine, one commonly sees urines of almost every color and shade. The beautiful blue green of methylene blue has lost fashion and has been replaced by the rich yellow of acriflavine, or the blood orange of pyridium or serenium. There are probably other colors yet to come and go before we awake from the depths of our gullibility sufficiently to realize that all is not as it is said to be with most dyes as urinary antiseptics.

In the changed appearance of urines one frequently finds his first suggestion of the direction his further diagnostic efforts should follow. The hazy urine urges that he add acetic acid to eliminate phosphates or boil a test tube full of it to eliminate urates. If the addition of dilute acetic acid increases the cloudiness of the urine it will usually be because the patient is taking orally one of the balsamic drugs. The dark urine covered with an apparently bile stained foam urges a test for bile. And all urge the wisdom of a microscopic study of the sediment.

**Odor of the Urine**—The odor of the normal urine when freshly passed is faintly aromatic. This may be changed by articles of diet or drugs, each with its characteristic aroma. A truly ammoniacal odor of a freshly passed urine bespeaks urinary stagnation in either the kidney pelvis or bladder. An odor of decay generally indicates necrosis of tissue and almost invariably denotes malignancy. The peculiarly unpleasant odor of colon bacilluria is hardly to be mistaken for anything else. The more concentrated the urine, the more pronounced an odor does it have and a febrile urine containing no abnormal cellular elements at times exhibits quite a penetrating aroma. Also it is not uncommon for patients with no urogenital pathology

to pass urine with a decidedly strong and unpleasant odor from time to time. This is particularly so in middle and later life.

**Quantity of the Urine.**—The rate of urinary excretion varies greatly in different individuals and at different times in the same individuals. And there are so many factors to be taken into consideration in determining what is a normal 24-hour quantity for a given individual that one is forced to have a wide range of possible normal. The yearly 24-hour output ranges from 1500 to 2000 c.c., the higher figures belonging to the cooler months and the lower to the warmer when much of the body moisture escapes in the form of perspiration.

The rather definite relation between fluid intake and urinary output must be taken into consideration in the estimation of what is normal for a given patient, as well as the state of the nervous system, the amount of coffee consumed and all other factors that increase or decrease urinary output, particularly skin moisture.

Children pass relatively more urine than adults do, and women less than men, owing to their usual small size. It has been estimated that urinary output on the average is about 1 c.c. per hour for each kilogram of body weight. Another average is 2 ounces per hour—1 for each kidney. The smaller amount of excretion occurs at night, more in the forenoon and much more during the afternoon.

As age advances there commonly is a gradual increase in the amount of urine excreted during the night, even in the absence of true pathologic conditions of the secreting structures. One should not, however, assume this to have taken place by other than actual measurement of the quantity of urine. For the aging bladder has not the comfortable distensibility of the youthful one and the necessity to empty it during the night often is due to this fact and not an increase in nocturnal urinary output due to a reduction in the power of urinary concentration.

**Reaction of the Urine.**—The normal reaction of freshly voided urine usually is on the acid side of neutrality, though it may normally swing to the alkaline side as the result of diet or ingested alkaline drugs. It varies in its reaction from time to time during the day, usually showing the greatest degree of acidity in the morning, with a definite swing toward or to the alkaline side during the first hour after meals. This, to a degree, may be occasioned by the amount of fluid ingested, as a highly diluted urine is rarely so acid as a concentrated one. It likewise bears a relation to the type food ingested, high-protein diets increasing acidity and vegetable diets reducing it. Highly nervous states very commonly reduce urinary acidity, and it is usual in such individuals that this reduction is sufficient to throw the urinary phosphates out of solution.

In the presence of infection, particularly if there be urinary retention, the urinary reaction may swing far to the alkaline side. This bacterial influence varies with the type of bacterium present, however, the staphylococcus, salmonella group and the *Micrococcus urae* causing swings far to the side of alkalinity, whereas the colon and tubercle bacilli usually cause an opposite reaction.

So great are the variations in reaction at various times of the day or night that tests of isolated samples are hardly to be relied upon. Prolonged exposure to air gradually but markedly reduces the acidity. For these reasons,



if accuracy is to be courted, 24-hour samples should be tested and, to avoid the changes of air they should be protected from the air until tested. This may be done by placing a layer of at least a half inch of liquid petrolatum or other neutral oil in the container. The specimen should be protected from bacterial change either by refrigeration or by the addition of an efficient germicide.

In the old days, before we were so familiar with bladder or urethral pathology, it was common custom to attribute such symptoms as frequency and burning on urination to a high degree of urinary acidity. We now know that this is only occasionally the cause of such symptoms in the absence of inflammation of the urinary conducting structures. It is unusual for acid urines to cause symptoms before the pH has reached 5.5 or lower and often there are no symptoms even when the pH is as low as 4.0. Indeed, the above symptoms more commonly are found where the urine is highly alkaline.

The newer work of Anson L. Clark and others on the treatment of colon bacillus infections of the urinary tract by markedly increasing urinary acidity through the use of the ketogenic diet, or by other methods has accentuated the need for far more accurate reaction determinations than were possible by testing with litmus paper. In response to this need the determinations of the hydrogen-ion concentrations have been so greatly simplified as to render unnecessary for clinical work the older, though more scientifically accurate, methods.

For the ready estimation of the reaction of the urine, as has been said elsewhere, perhaps the simplest reasonably accurate form of apparatus is the LaMotte hydrogen ion comparator set (Fig. 25) devised for this purpose. By the use of the indicator furnished with the set it is a simple matter to determine the hydrogen ion concentration by a comparison of the extent to which the urine changes its color with the color of the assortment of standards furnished. Such an estimation may be carried out in a very few moments and, when it is done with reasonable care, the resulting figures are clinically reliable. The indicator has a range between 4.4 and 8.6.

An even simpler method for the hydrogen ion concentration estimation of urine is by the use of the nitrazine test of Parke, Davis and Company. In the carrying out of this test it is merely necessary to immerse the end of the special paper slips impregnated with nitrazine in the urine, as one would ordinary litmus paper, and compare the changed color with those upon a standard color card. This test has a hydrogen ion range from 4.5 to 7.5. It is said to compare well in accuracy with other tests and its simplicity is a great recommendation for its use. Where need be, it can be carried out by the patient.

**Specific Gravity of the Urine**—The specific gravity of urine is dependent upon so many factors as to make a determination upon other than a 24-hour sample of urine almost valueless in many cases. During different parts of the day in the same individual it frequently will show the widest of variations. Not only does the specific gravity vary during the day, but that of 24-hour samples will vary from day to day dependent upon such questions as activity, external temperature, nervousness and diet. It may vary from 1.003 after drinking large quantities of water or beer, to 1.140 or even higher on a limited water intake with copious perspiration. In health, and usually in

disease, it may be said that the specific gravity of the urine bears an inverse relation to the amount of fluids consumed, with an allowance for the amount of perspiration.

Not only may the urine undergo marked changes in specific gravity during health but the same is true of it in pathologic conditions, particularly those of the kidney itself. And these changes may range from the extremely low specific gravity of chronic nephritis to the high specific gravity at times encountered in acute nephritis. In diabetes mellitus associated with glycosuria we see no such fixed inverse ratio between the amount of urine and the specific gravity.

The usual method of clinical determination of specific gravity is by means of the urinometer. The usual urinometer is calibrated for the specific gravity of fluids at 22.50° C. and, for absolute accuracy, should require the correction of the reading for changes in temperature. This change, however, is so little that, for clinical purposes, correction rarely is carried out, as it seldom varies more than two or three points for average room temperature.

In clinical practice the determination of the specific gravity of an isolated specimen of urine, if unusual, should be viewed as an indication for further study. Surely, it must be considered in conjunction with other things brought out in the history and the microscopic study of the urine. Such determinations yield their greatest value when taken in relation with fluid intake, urinary output and comparative changes in the quantity of urine and the specific gravity at various periods in the twenty-four hours, as in the Mosenthal test. Used in this way they are of extreme value in the estimation of renal functional possibilities.

**Glucose in the Urine.**—The presence of sugar in the urine may be a transitory or continuous symptom. As a transitory symptom it usually is due to the ingestion of large quantities of sugar, whereas permanent glycosuria is due to diabetes mellitus. Minute traces of sugar are always present in the urine, though they are not of sufficient quantity to be determined by the usual clinical tests for the presence of sugar. While urines containing sugar are usually of high specific gravity, one should not assume that because the specific gravity is not high sugar is not present, for sometimes it is found in urines of rather low specific gravity. While the average sugar content of diabetic urine ranges from 3 to 5 per cent, it at times reaches as high as 10 per cent and as much as 100 grams of sugar may be eliminated daily in the presence of severe diabetes mellitus.

The simplest and the most commonly used test for sugar is Benedict's modification of the Fehling test. Benedict's qualitative reagent solution is compounded as follows:

|  |             |
|--|-------------|
| Copper sulfate . . . . .               | 17.3 grams  |
| Sodium citrate . . . . .               | 173.0 grams |
| Sodium carbonate (anhydrous) . . . . . | 100.0 grams |
| Distilled water to make . . . . .      | 1000.0 c.c. |

In the preparation of this solution the citrate and carbonate should be dissolved in 500 c.c. of distilled water at boiling temperature. The copper sulfate should be dissolved in 100 c.c. of distilled water and then added

slowly to the other solution during constant stirring. The combined solutions should be made to 1000 c.c. by the addition of sufficient distilled water.

In the performance of this test 5 c.c. of the reagent is placed in a test tube and not more than 8 drops of urine are added to it. The fluid is then vigorously boiled for one or two minutes and allowed to cool spontaneously. The occurrence of a red, yellow or green discoloration indicates the presence of sugar. If sugar is not present this fluid remains clear or shows a very faint turbidity. Some workers place the tube in boiling water for five minutes, while some do so after bringing the reagent and urine to boiling temperature.

Accurate quantitative tests for sugar are too intricate for general office work and had best be done in a better equipped laboratory than usually is found in the physician's office. Kolmer and Boerner suggest the following scheme (after Todd and Sanford) for a rough quantitative method by the use of the Benedict test carried out by boiling the tube for two and one half minutes and then placing it in boiling water for five minutes and allowing it to cool spontaneously.

- + 1 Slight trace. No reduction is evident during boiling but appears upon cooling (greenish).
- ++ 2 Trace. Reduction occurs after about one minute's boiling.
- +++ 3 Moderate. Reduction occurs after 10 to 15 seconds' boiling.
- ++++ 4 Large amount. Reduction occurs almost immediately after adding urine to the boiling reagent.

**Albumin in the Urine.**—Albumin is present in minute quantities in all samples of urine. The amount, however, is too small to be demonstrated by any of the tests usually employed for its presence. All of the tests commonly used are subject to error, even if properly carried out, and the greater the laxity in their performance the greater is the possibility of error. The tests depend upon the coagulation of albumin by either heat or chemicals and should all be done with clear samples of urine. Thus, if the sample to be studied is not clear it should be rendered so by filtration or centrifugation. In the presence of bacteriuria greater care than centrifugation may be required to render it clear enough for study. For this purpose Kolmer and Boerner recommend adding a teaspoonful of purified talc, infusorial earth or animal charcoal to each 2 or 3 ounces of urine, shaking well and filtering through two thicknesses of filter paper. In this procedure a small fraction of the albumin is removed by absorption.

The tests coagulate not only serum albumin but serum globulin as well and do not differentiate between them. Earthy phosphates also make a slight cloud in the urine by boiling but immediately are dissolved by the addition of a few drops of acetic acid. On the addition of acetic acid albumin is not dissolved but its cloud often is increased. Mucin and other constituents may form a slight cloud, this frequently may be overcome by adding enough sodium chloride to increase the specific gravity of the urine.

**Boiling and Acid Test.**—This test usually is carried out by filling a test-tube two thirds full of urine and passing the upper inch or more of fluid back and forth through the flame until it reaches the boiling point. From 3 to 5 drops of dilute acid (no more) are then added carefully to dissolve

any haziness due to earthy phosphates. Any remaining cloud is usually interpreted as being due to albumin. Faint traces are more easily seen if the tube is held against a dark object for comparison of the upper and lower portions of the tube.

This test has the advantage of lending itself to a rough quantitative estimation. According to Kolmer and Boerner,<sup>1</sup> "Complete solidification amounts to 2 to 3 per cent albumin. Precipitates reaching one-half, one-third, one-fourth and one-tenth the height of the column of urine correspond roughly to about 1, 0.5, 0.25 and 0.1 per cent albumin." For such quantitative estimation the entire tube of urine must be boiled and set aside for sedimentation. Patients on the oral administration of the balsamics may show a heavy haze in the urine on boiling or on the addition of acid. This easily is differentiated from albumin by the addition of some alcohol, which immediately dissipates the haziness due to these drugs.

**Exton's Test.**—A more highly sensitive qualitative albumin test is that developed by Exton, wherein his reagent composed of sodium sulfate 200 grams, sulfosalicylic acid 50 grams, and water to make 1000 c.c. is used. This solution is prepared by dissolving the sodium sulfate in 700 c.c. of hot water, allowing it to cool, adding the sulfosalicylic acid dissolved in cool water, and then adding water to make 1000 c.c.

The method of carrying out the test is as follows: If the urine is not clear make it so by filtration or centrifugation. Mix equal quantities of the reagent and the urine and if a cloud does not form the test is negative. If a haze does form and persists after gentle heating (not boiling) it is due to albumin.

**Purdy's Test.**—A saturated solution of sodium chloride is made as a stock solution. In carrying out the test, urine is placed in a test-tube and to it are added a one-sixth volume of the sodium chloride solution and from 5 to 10 drops of a 50 per cent acetic acid. The upper portion of the tube is then boiled and studied for any cloudiness that may appear. If a haze forms which disappears on cooling it is due to Bence-Jones' protein. Otherwise, the haze is due to albumin.

**Heller's Nitric Acid Test.**—Heller's nitric acid test likewise is simple and useful. A tube containing some urine is held in a slanting position and a few c.c. of nitric acid are allowed to trickle down the side of the tube from a glass pipette. If properly done the fluids will not admix but the nitric acid will flow to the bottom of the tube and, if albumin is present, a white ring will appear at the point of contact of the two fluids. This test serves several purposes, for, if an excess of indican is present a purple band will appear, if bile, a green band, if mucin, a cloudy band above the point of contact. Uric acid in quantity forms a faint waving ring above the contact line of the liquids. Here, again, one may be mistaken by the separation of resin acids in an individual taking balsamic drugs. These can be differentiated readily by the addition of alcohol, which immediately dissolves the cloud due to resin acids.

**Bile in the Urine.**—If, when shaken, the foam on a highly colored urine assumes a yellowish hue, one usually finds that this color is due to the presence

<sup>1</sup> Kolmer, J. A. and Boerner, F.: "Approved Laboratory Technic." D. Appleton Century Company, New York, 1931.

ence of bile Unfortunately in these days this observation is not sufficient for a safe diagnosis for the widespread use of the various dyes as urinary antiseptics may lead to error in this regard

A small quantity of concentrated nitric acid may be carefully overlaid by some of the suspected urine At the point of contact of the two fluids a greenish ring appears if bile is present

The same type of ring appears if bile is present when the urine is overlaid by tincture of iodine

Hays advises the adding to the urine of some powdered sulfur which if bile is present rapidly sinks to the bottom of the tube because of the reduction in surface tension occasioned by the bile salts If the sulfur sinks at once the bile content is at least 0.01 per cent If it sinks slowly and only after gentle agitation the amount is much less and if it does not sink at all bile is absent

**Chyle in the Urine**—Chyluria is characterized by the presence of almost microscopic droplets of fat in the urine In the case of true lipuria much larger globules are present Such a urine usually contains albumin fibrin leukocytes and red blood cells The latter may be present in sufficient numbers to give a reddish tinge to the urine Upon standing the fat rises to the top while the leukocytes and red blood cells sink to the bottom The upper fat containing portion of the urine can be cleared by shaking with chloroform or ether The solvent upon evaporation leaves a fatty residue

The condition usually is due to infestation by the *Filaria sanguinis hominis* and the microfilaria frequently can be found in the urinary sediment Their absence however does not negative filaria as a cause

**Yeast Cells in the Urine**—The finding of yeast cells in quantity in a freshly voided urine raises the suspicion of either a dirty container or diabetes mellitus The same finding in a stale urine is so common from air contamination that little attention is given to the matter

Yeast cells rarely linger around the genitalia in numbers unless there is sugar in the urine Such a finding naturally is more common in the glycosuric female than in the male At times however it occurs in the male with a redundant prepuce particularly if he has any irritation of the preputial sac

**Mucus in the Urine**—When normal urine stands for a short while the contained mucus separates from it in small nebulous accumulations which upon further standing slowly sink to the bottom of the beaker At times there is a thin nebula of mucus at the top of a freshly voided sample of otherwise clear urine This is particularly true of the first sample voided in the morning It is more pronounced in younger than in older adults, and in those who have been subjected to recent chemical injections or irrigations It is a matter of no pathologic significance although it at times causes nervous patients some anxiety

In the presence of bladder irritation particularly if there be a slight amount of residual urine the patient commonly passes a small or large amount of mucus usually in the last portion of urine At times this is thick stringy and contains sufficient phosphates to give it the appearance of pus The addition of strong sodium hydroxide solution to such a urine causes the mucus to coagulate into a tenacious gel One however cannot be sure that pus is not present without a microscopic study of this gel Such ma

terial, when stained, gives a faintly stained background of the color of the stain used, and any cellular elements in it take a much deeper shade of the stain which makes them easily discernible from the more faintly stained mucus.

**Pus Cells in the Urine.**—The pus cell, so-called, is the polymorphonuclear leukocyte of the blood. Normal urine always contains a few leukocytes, but not more than several to the high-power field in the sediment of a 15-c.c. centrifuge tube of urine. When occurring in greater numbers they are an evidence of either mucosal irritation or infection and call for further study as to their cause and source.

It is not always the simple matter that one would suppose to differentiate these cells from the small round epithelial cells of the upper urinary tract or the deeper epithelial layers of the lower tract, from which they may not differ in the least in size. If doubts arise, a drop of dilute acetic acid placed under the coverslip overlying the specimen will, as a rule, accentuate the nuclei sufficiently to avoid confusion. If doubts still exist a drop of Gram's iodine solution may be allowed to flow under the coverslip. This stains the pus cells much more deeply than the epithelial cells and accentuates the nuclei of both.

In catheterized kidney urines these differential precautions are particularly valuable, for such urines usually contain many round epithelial cells, either isolated or in clumps, which far too commonly are mistaken for polymorphonuclear leukocytes.

In acid urines pus cells are much smaller than is the case in alkaline urine. In the latter they often are swollen, transparent, lack the granules so prominent in those in acid urine, their nuclei are scarcely visible, they often have a degenerated appearance and show a tendency to disintegrate.

The lower the specific gravity of the urine the larger is the leukocyte. When one is in doubt about cells in urine of high specific gravity, the doubt usually can be settled by centrifugating the urine, pouring off the supernatant fluid, shaking the sediment in distilled water and recentrifugating before staining.

Pus cells from prostatic secretion have a tendency to rupture in urine. This often gives a faulty cell count if one is studying the sediment of urine into which prostatic secretion has been expressed.

Urines containing any great number of pus cells usually show a trace of albumin from the contained proteins.

**Epithelial Cells in the Urine.**—Epithelial cells of one type or another are found in every specimen of urine. Some come from the various portions of the urinary tract and some from the external genitalia, particularly in the female or the male with a redundant prepuce. If measures are taken to avoid cells from the external parts, a simple matter in both sexes, it may be assumed that the presence of large numbers of cells in the urine are of pathologic significance.

The older teaching that the point of origin of these cells could be told by the character of the cells present is hardly to be relied upon. One who has had an opportunity to compare the cells seen in catheterized kidney urines with those in catheterized bladder urines and those normally voided will be impressed with the futility of microscopic studies as a safe means of localization.

The small round cells so common to catheterized kidney urine differ little if at all, from those brushed from the deeper layers of the urethral mucous membranes by instrumentation of any kind. The tendency of many mucosal cells to assume a circular outline immediately after becoming detached leaves one only the question of differences in size rather than in form. About all that safely should be said is that large scale like cells come from either the bladder urethra or external genitalia. Caudate and columnar like cells may come from any portion of the tract as may large and small round cells.

The safer means of localization is that of segregating the urine into two or more glasses as voided. Large quantities of cells in the first glass of urine with few in the second glass point to urethral origin. Large numbers in both glasses point to the bladder perhaps to the upper tract and to the urethra as well.

Many small round cells together with epithelial casts of the renal tubules leave little doubt as to their point of origin. Groups of spindle shaped cells more commonly come from the seminal tract and large coarsely granular cells from the prostate gland.

Large quantities of squamous cells are commonly observed in urines from females with vesical irritation without infection. Males who have had much urethral trauma either chemical or instrumental or who have a tight urethral stricture usually have many squamous cells in their first glass of urine. It is rather uncommon to find large numbers of squamous cells in the second glass of urine in the male in the absence of pus. The male bladder evidently does not desquamate so easily as does the bladder of the female.

At times it becomes necessary to prove that small round epithelial cells are not leukocytes which they often closely resemble. This can be done in the manner described under the heading of Pus Cells. It can be done even more surely by staining a fixed specimen of the urinary sediment.

**Bacteriuria**—The presence of large numbers of bacteria in the urine in the absence of pus may cause the urine to appear definitely hazy. More often than not these bacteria are of the colon group. Upon rare occasions there may be a staphylococcuria of sufficient grade to cause a departure from the crystalline clearness of normal urine.

Colon bacilluria may or not be associated with pyuria. Aside from the microscopic finding of many motile bacilli in the sediment and the typical odor colon bacilluria has another characteristic. The supernatant urine does not clear entirely by either standing or by centrifugation. There is a persistent haziness to the entire specimen.

A staphylococcus laden urine is readily cleared by sedimentation or centrifugation. It is alkaline in reaction and generally exhibits small flakes of amorphous phosphates.

A specimen of the sediment of either urine stained by the Gram method leaves no doubt regarding the cause of the urinary haziness.

**Blood in the Urine**—The presence of blood in the urine usually is determined with ease by means of the microscopic study of a fresh sample. It occasionally happens because of urinary reaction or concentration that there are no red blood cells left in the urine and one has to make chemical tests for blood. Particularly is this true of patients who present themselves with a colored urine due to medication with such substances as pyridium

and serenum, as the color of such urine is highly suggestive of the presence of blood. As it is extremely rare to find any great quantity of blood in the urine that is not due to some pathologic lesion of importance to the patient, it is of the utmost importance that its presence be determined.

Red blood-cells in urine vary in size with the specific gravity of urine. Those in urines of low specific gravity are greatly swollen, while those in heavier urines are much reduced in size. These latter may be round, crenated or so contracted and irregular as to be recognized with difficulty.

A number of tests have been devised for this purpose, the simplest of which is, perhaps, *Keller's potassium hydroxide test*. In this test 10 c.c. of urine is strongly alkalinized with potassium hydroxide and heated to boiling. Upon allowing the heated urine to stand, a precipitate of phosphate, colored red by the contained hematin is formed. This test should be controlled by boiling a tube of normal urine and allowing it to cool under the same conditions. Such substances as cascara sagrada, rhubarb, santonin and senna may give a reaction similar to blood. These are differentiated by the fact that the addition of a few drops of acetic acid will not only dissolve the

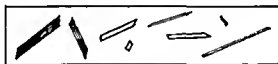


Fig. 73.—Hemin crystals.

precipitated phosphates but will cause the disappearance of the color if due to any of these substances, whereas the color due to hematin persists.

A more simply performed, though less delicate test may be carried out by the use of the benzidine tablet of E. R. Squibb and Company for the determination of the presence of occult blood.

*Teichmann's hemin test* likewise is a very delicate test for the presence of blood pigment. In the performance of this test a small amount of the suspected urine is placed on a microscopic slide and a small grain of sodium chloride is added to it, after which it is carefully evaporated to dryness over a low flame. A coverslip is now placed upon it and a drop of glacial acetic acid is allowed to flow under the coverslip. It then is warmed gently until the formation of gas-bubbles. The preparation now is cooled and examined under the microscope for the presence of the typical hemin crystals.

#### URINARY CRYSTALS

**Ammoniomagnesium Phosphates (Triple Phosphates).**—Ammoniomagnesium phosphate crystals in urine are an evidence of alkaline fermentation. They are observed commonly in stale specimens of urine as the result of alkaline fermentation after being voided by the patient. When these crystals are found in a fresh specimen of urine they are nearly always an evidence of urinary stasis in some portion of the urinary tract. This point of residuum may be either in the upper or lower portion of the tract, more commonly the latter.

These crystals usually are found only in alkaline specimens of urine, but are occasionally seen in amphoteric or slightly acid samples. The fact that many samples of urine undergo a change to the alkaline side of neutrality



upon standing makes the ammoniomagnesium phosphate crystal one of the most frequent to be encountered in routine laboratory examinations of urine. The habit of attributing its presence to changes after being passed by the patient has caused urinary stasis to be overlooked in many patients. Unless the specimen was known to be decidedly acid in reaction when



Fig 74 - Ammoniomagnesium phosphates

voided, a report of the presence of triple phosphate crystals should urge the wisdom of examining a fresh specimen of the urine.

**Calcium Carbonate**—This crystal, common in the urines of herbivorous animals, occasionally is found in human urine. Such urine is usually highly alkaline, though it may be amphoteric or slightly acid. Calcium carbonate has no pathologic significance. The dumbbell shaped variety shows a re-

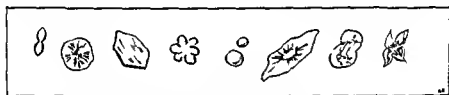


Fig 75 - Calcium carbonate

semblance to some calcium oxalate crystals but can be differentiated from them readily because of being quickly soluble in dilute acetic acid.

**Calcium Phosphate**—The presence of either amorphous, crystalline or granular calcium phosphate crystals in a freshly voided urine may have the same significance as have triple phosphate crystals, that is, stagnation of urine. More often, however, they are an evidence of reduction in urinary

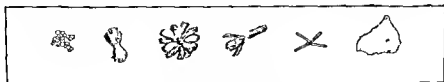


Fig 76 - Calcium phosphate

acidity or true alkalization. They are more common during periods of nervous stress and are frequently seen in quantity in the urines of gonorrheal patients. At times they are so abundant as to make the urine decidedly turbid when voided; at others they give to it a slight opalescence only. Microscopically they often are mistaken for acid sodium urate crystals but are easily differentiated from them by their marked solubility in even weak acetic acid solution.

**Calcium Oxalate.**—Perhaps no urinary crystal is of more importance in office examinations than is the octahedral or envelope crystal of calcium oxalate. Of them all it is the only one that, of itself, is a symptom-producer even in small numbers. It accounts for a good number of cases of frequency and burning on urination in patients presenting an otherwise normal urine. When present in any quantity these crystals almost invariably are accompanied by varying numbers of red blood-cells.

The so-called "dumbbell crystals" of calcium oxalate are not of so frequent occurrence as are the octahedral crystals. Both may occur in acid, neutral or alkaline urine and are not dissolved by acetic acid. Calcium oxalate crystals occur commonly in individuals consuming any quantity of



Fig. 77.—Calcium oxalate.

grapefruit, rhubarb, tomatoes, spinach, apples, or large quantities of carbohydrates.

Pathologically they may occur in quantity in diabetes mellitus, organic diseases of the liver, derangements of gastro-intestinal function, particularly constipation, and in diseases of the heart and lungs associated with poor oxidation.

**Uric Acid.**—Uric acid crystals may be found in quantities in the freshly voided urine of apparently healthy individuals. Yet, they occur more frequently in the presence of gout, febrile conditions, interstitial nephritis and in individuals on a high-protein diet.



Fig. 78.—Uric acid.

They may be visible to the eye, at times, as reddish-yellow crystals. Pure uric acid crystals are colorless, but those found in the urine rarely are pure and vary in color from a pale yellow to a golden brown. No urinary crystal assumes a greater variety of forms. The so-called "whetstone crystal" is the one most commonly seen, but rhombic, quadrate, prismatic, rosette, wheatsheaf, dumbbell and hexagonal forms occur.

These crystals are recognized by their shape and color. They are found in acid urines, disappear upon the addition of a few drops of alkali and reappear if acetic acid is added.

**Urates.**—While sodium urate is the uric acid salt most commonly found in urine, the ammonium urate crystal is of most importance from a practical point of view.

standpoint It commonly is associated with the triple phosphate crystal in fermented urine and suggests urinary stagnation if present in freshly voided

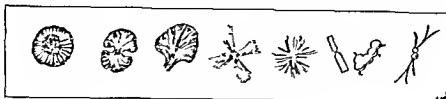


Fig 79—Urates

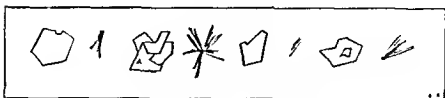


Fig 80—Leucin and tyrosin



HYALINE CASTS



GRANULAR CASTS



EPITHELIAL CASTS



BLOOD CASTS



PUS CASTS



FATTY CASTS



WAXY CASTS



NORMAL BLOOD CELLS

CRENATED BLOOD CELLS



SPERMATOZOA



CYLINDROIDS

Fig 81—Renal tube casts red blood-cells and spermatozoa

urine It may occur in alkaline, neutral or acid urine, whereas calcium, magnesium, potassium and sodium urates are present only in acid urines

Sodium urate usually forms the greater bulk of urate deposits and is most commonly amorphous, though at times it arranges itself in fanlike and wheatsheaf bundles

Ammonium urate usually assumes the form of thorn apple or spherular crystals of various sizes, and of a yellowish-red or brown color.

Potassium and calcium urates are usually amorphous. Urines heavily laden with amorphous urates are more often highly acid, concentrated urines than pathologic. Urines rendered cloudy by urates clear on boiling but not on the addition of small quantities of acetic acid.

Leucin and Tyrosin.—Among the rarer of urinary crystals are leucin and tyrosin, which practically always are found together. Leucin crystals are highly refractile spherical masses with both radial and concentric striations. Tyrosin crystals are colorless, fine, needle-like crystals arranged in sheaves.

They are found pathologically in acute phosphorous poisoning, acute yellow atrophy of the liver, cirrhosis of the liver, severe typhoid, and anemia. Rarely are they seen in the absence of systemic disease.

#### THE PREPARATION OF MATERIAL FOR STAINING

Prior to the introduction of sulfanilamide and its derivatives it was rather common custom to confine routine microscopic studies of material from the urogenital tract to the fresh secretions and to dried stained spreads of either urethral or prostatic secretions. The need, of course, was always there for more careful studies but they seldom were done by the vast majority of office workers.

Since these drugs have been in use there has been evident an urgent need for types of study that lend themselves to greater accuracy of findings and a wider range of utility. This is particularly true when it comes to settling that most important question regarding the cure of gonococcal infection. For, in the common absence of urethral discharge, one must turn to the study of urinary sediments, urinary shreds and prostatic and seminal fluids, where he finds no such simplicity as held in his direct studies of the urethral secretions.

The closer study of these materials is not required for gonorrhea alone but has a place in all other infections of these structures. Though it often is necessary to resort to cultures for bacterial identification, direct smears not infrequently are of far more value in localizing infection in a particular structure. Further, since there are many bacteria which can be recognized by morphology, staining reaction, or both, direct smears often give immediate answers, and at the same time avoid the expense and loss of time required by cultural studies. Indeed, such studies, carried out carefully, often will serve as a check on cultural findings and, as often as not, will reveal information that cultures alone could not furnish. So true is this, and of so much diagnostic importance is it, that it is not without value to go into some detail regarding the limitations of urogenital culture studies and the greater flexibility of direct studies of properly prepared spreads from the various portions of the urogenital tract.

In comparing the two let us resort to actual cases as a means of accentuating the points with greater brevity than would be possible by other means. We might start with our commonest pathologic combination wherein cultures alone are so prone to mislead, and to this effect Mr. B. furnishes an excellent example. His urine had been cultured many times in a distant city and always the colon bacillus had been grown. His diagnosis was colon

bacillus pyelitis, with secondary cystitis and prostatitis. The diagnosis had been based upon cultures of his separate kidney urines and his prostatic secretion expressed after urination. In the culture from the prostatic secretion there were some staphylococci which were considered to be urethral contaminants. Direct study of stained smears revealed the following: Upper tract urines, neither pus nor bacteria. Bladder urine, countless gram-negative bacilli, evidently colon. (There were 30 c.c. of residual urine in his bladder.) Prostatic secretion, many gram-positive cocci and only two or three gram-negative bacilli.

These latter findings caused an entire reversal of his diagnosis and showed two common cultural errors. It was possible that a few colon bacilli came from his kidneys during the earlier studies but, beyond question, most of them were picked up during the transit of the urethral catheters through an infected bladder. (The residual urine had not been discovered.) Some of the staphylococci came from his prostate gland.

Instead of being the victim of a bilateral colon bacillus pyelitis and a colon prostatitis, he had no upper tract infection and no colon bacillus prostatitis. What he had was a mild grade of median bar formation causing some residual urine in which colon bacilli were flourishing. This vesical outlet fibrosis had resulted from a long-standing focal infective prostatitis of staphylococcal origin. And this probably had been secondary to a number of tooth root abscesses.

For our further consideration of the question we could take Mr. W., whose faulty diagnosis was due to culture errors and poor microscopic work. His culture diagnosis was also bilateral pyelitis, while his microscopic diagnosis was chronic gonorrhea. The cultures of his two kidney urines and his bladder urines had shown staphylococci. Later microscopic study of the separate urines showed normal urine from his right kidney, and urines containing countless pus cells and gram-positive cocci from his bladder and his left kidney. (During the cystoscopic studies, of which he had had two, 100 c.c. of residual urine had been overlooked.) The diagnosis of gonorrhea had been made because of the presence of countless intracellular diplococci. (Methylene blue stain had been used.) A Gram's stain showed these diplococci to be definitely gram-positive. The same bacteria were present in his prostatic secretion.

Mr. G., a medical student, had had a cultural diagnosis made of unilateral colon bacillus pyelitis and had been treated for it during three years of his college course. So far as it went the diagnosis was correct. A microscopic search for tubercle bacilli showed that there were many of them present and examination of the kidney upon removal, confirmed the diagnosis.

It would be a simple matter to extend this list greatly if it were needed to prove the point. Even these few should serve to demonstrate that, by the careful microscopic search of the fluids obtainable from the various portions of the tract, one commonly does a far more accurate study than is possible by culture alone. Furthermore, it can be done while the patient still is present.

In order to do such studies reliably, it is necessary that certain characteristics of these fluids be understood, as well as how to overcome those things that mitigate against satisfactory results. In this region we are concerned with four fluids, namely, urethral discharges, urine, and prostatic and seminal

fluids. And in all of these we are interested in both their cellular and bacterial contents. The first, urethral secretion, we may dismiss by the statement that if thin smears are made, it lends itself to immediate staining as soon as it becomes fixed to the slide. The cells usually are large and any bacteria in them can be seen and studied with ease, if properly stained. No such simplicity, however, holds with the sediment of urine, or with either prostatic or seminal fluids. Because of this, it is of value to discuss each one separately.

**Urine.**—Aside from the fact that urinary sediments, unless rich in pus cells, ordinarily do not adhere to the slide unless specially prepared, there is much value in a consideration of their cellular contents under varying conditions. In gonococcal infections we rely much upon the intracellular location of bacteria and, in order to determine this fact, we must have cells in which the protoplasm can be seen. In highly acid urines and those of high specific gravity, leukocytes are usually so shrunken that there almost is no protoplasm visible and any bacteria therein are forced so closely against the nuclei that it is almost impossible to see them. It, thus, can be seen that not only must we overcome the tendency of urines containing little pus to wash from the slide during staining efforts, but we do well to enlarge the cell so that any bacteria in its protoplasm can be seen plainly. This latter can be done by washing the urinary sediment with either distilled water or normal salt solution.

Urinary sediments washed with distilled water have their leukocytes enormously enlarged. Frequently the cell walls are ruptured so that the intracellular bacteria lie in a clear area around the enormously enlarged nuclei.

Cells washed with normal salt solution are swollen, the cell wall is intact and there is never any question about intra- or extracellular location of the bacteria present.

The writer's usual treatment of urinary sediments is as follows:

1. Centrifugate a 15-c.c. tube of urine and invert it quickly to pour off the supernatant urine. (The sediment remains in the tip of the tube.)
2. Pour in a quantity of either distilled water or salt solution and shake until the sediment is mixed with it.
3. Centrifugate this, invert the tube and keep it inverted until material for a spread is obtained from the tip, either by a platinum loop or small cotton-wrapped applicator.
4. Spread on a slide, dry, fix by gentle heat and stain by Gram's method.

**Prostatic Secretion.**—Not only do smears made from fresh prostatic secretion have a marked tendency to peel from the slide during the process of staining but also it is rare that such a specimen can be studied microscopically with great satisfaction. Usually the leukocytes are so shrunken that intracellular bacteria are seen with difficulty or not at all. Between the cells is a background taking the counterstain with varying degrees of intensity and containing many small round bodies that easily could be mistaken for cocci. These disadvantages can be overcome readily by washing the secretion as has been described in the preceding paragraphs for urine. However, it is a shorter procedure and is carried out as follows:

1. The expressed prostatic secretion is allowed to fall into a centrifuge tube containing distilled water, or salt solution.

2 The tube is shaken until the secretion is in suspension and then centrifuged and treated as is urinary sediment

In spreads made in this manner the clusters of leukocytes are broken up, their protoplasm is broad and clear and the confusing background encountered in the unprepared secretion is missing. Not only is the spread ideal for microscopic study but one never is in doubt regarding the location of the bacteria contained

As is pointed out elsewhere, staining methods, even where the fresh dried secretion is used cannot be used for the determination of the leukocytic content of prostatic secretion. This must be done by a study of the fresh secretion for countless leukocytes disappear in the process of drying. What leukocytes remain gather in clusters with wide spaces free from cells between them

**Semen**—The study of direct spreads of seminal fluid is almost as uncertain as is that of prostatic secretion that has not been washed. They show the same tendency to peel from a slide as does prostatic secretion, and areas around the cells take the counterstain in such a way as to prevent a clear view of either the cells or the bacteria. Treated in the same way that has just been described for prostatic secretion, the cellular elements and bacteria are clearly delineated. If there is much vesicular gel in the secretion, washing in a 5 per cent sodium bicarbonate solution more quickly dissolves it out. This solution, because of its higher specific gravity, must be then diluted by distilled water before centrifugation or the bacteria and cellular elements may fail to be thrown down

**Urinary Shreds**—Shreds may be fished from urine with a bacteriologic loop and smeared directly upon a slide. If they contain much mucus they are often quite difficult to study under such a technique. If they are allowed to form a sediment the supernatant urine is poured off and they are washed as has been described for urinary sediments, they are much more easily studied. It is well however, to shake such urines vigorously to break up the shreds before centrifugation

**The Treatment of Urine for Searches for the Tubercle Bacillus**—Science says that only catheterized specimens of urine should be used in searches for tubercle bacilli. But if one did only as science says there would be many cases of renal tuberculosis that escaped detection for far longer periods than is at present the case. She became so insistent about this matter in the old days when we heard so much about the smegma bacillus as an element of confusion in precystoscopic days when one depended more upon the presence of the tubercle bacillus for a diagnosis than is the case today

Today as has been said we require and get much more support than just the bacillus for a diagnosis of urogenital tuberculosis. The finding of that bacterium simply tells the modern urologist that there is a tuberculous lesion and that it is his job to find out where and how much

As elsewhere is discussed the danger of confusing the tubercle bacillus with other bacteria is highly chimerical. The writer, some years ago searched a large number of urines that had been subjected to every chance of contamination that he could devise, even to having some patients with decidedly unclean preputial sacs balloon these with urine as they voided. In not one of these specimens could he find a bacterium which one even slightly familiar with the microscopic appearance of the tubercle bacillus

ing, neither of which is in the least degree complicated. Familiarity with the technic of Gram's method and the stain for tubercle bacilli leaves little to be required, so far as patient office study is concerned. One must, however, be equally familiar with the possibilities for error of each method, both as to technic and as to microscopic interpretation.

**Modified Gram Method.**—In carrying out this method with the materials described on a previous page one should proceed as follows:

1. Crystal violet for about 30 seconds.
2. Flood with iodine solution, pour off and reflood, allowing it to act about 20 seconds.
3. Wash slide with acetone until no more color comes away (usually about 5 seconds).
4. Wash with distilled water (1 second).
5. Apply basic fuchsin solution for 10 seconds.
6. Wash again with distilled water and pass slide carefully through flame with spread uppermost, to dry for study.

The resultant specimen shows all gram-positive substances a deep purple and the gram-negative ones a bright red. Thus, all the cells and gram-negative bacteria should be red, though in some samples of pus the nuclei of cells often do not decolorize well and remain purple. The heads of spermatozoa, yeast cells and all gram-positive bacteria are purple. As previously has been pointed out, many bacteria usually placed in the gram-positive list show gram-negative elements. These generally are in close apposition with kindred bacteria that stain deep purple, and should cause little, if any confusion. Most gram-negative bacteria do not have gram-positive elements. Some few bacteria are in an indifferent position, having many elements on each side of this dividing line.

The most important step in the carrying out of Gram's method of staining is the use of the iodine solution. If this solution is too weak, or is washed off too quickly, there commonly is a great increase in the number of gram-negative elements of normally gram-positive bacteria. If these bacteria happen to be bacilli, they seldom cause great confusion, but if, as usually is the case, they happen to be cocci there is great danger of their being mistaken for gonococci. The writer has known this to happen on a number of occasions, to the chagrin of the worker and the great anxiety of the patient. One example was that of a hospital resident physician who, while being studied for some ailment, mentioned that he also had an urethral discharge. The hospital bacteriologist studied spreads of this discharge and, finding them negative, took a culture. An uneasy conscience prompted the victim to study spreads of the culture before the bacteriologist had an opportunity to do so. He used the laboratory Gram method and was greatly shocked to find nothing in the spread but gram-negative diplococci. He filched the culture and made a hurried appointment with the writer. Inspection of the spread he had stained showed it to be composed solely of seemingly gram-negative diplococci. These, however, were slightly smaller than gonococci, though of the same morphology. A carefully carried out Gram's stain showed all of them to be definitely gram-positive with absolutely no negative elements. He later reported that the laboratory iodine solution was so weak as to be practically colorless. In other words, the iodine had evaporated, as it gradually will do.



As a matter of fact it is far safer for him who would court accuracy in diagnosis unless he be rather an unusual individual who always would use both a methylene blue and Gram's stain on every spread not to have the former stain within easy reach. On a number of occasions the writer has been told by seemingly truthful souls that they used the single stain because it was kinder to the eye and then used Gram's stain on slides that looked suspicious. Being asked just how they carried out the particular Gram's stain modification they used they generally were plunged into a confused mental state that gave mostly no evidence of a knowledge of either the stain or how to use it. Further just which urethral smears are not suspicious.

From a wealth of experience and observation regarding the possibilities for error in the use of methylene blue or any other single staining method the writer feels that they should be mentioned only to condemn them. They are retrograde science and a social menace. They need no description for diagnostic use in a tract where the saddest of misfortunes may follow the errors of interpretation that they so commonly cause. Life health and happiness too often depend upon correctness of diagnosis in urogenital maladies to allow laziness or lack of interest to tempt one to pass by the simplest of all methods of bacterial differentiation—the Gram method of staining.

#### STAINING REACTIONS OF BACTERIA COMMON TO THE UROGENITAL TRACT

| <i>Gram negative</i>    | <i>Gram positive</i> |
|-------------------------|----------------------|
| Gonococcus              | Staphylococcus       |
| Micrococcus catarrhalis | Streptococcus        |
| Coli group              | Pneumococcus group   |
| Ducrey bacillus         | Doderlein bacillus   |
| Typhoid group           | Diphtheria bacillus  |
| Bacillus pyocyaneus     | Bacillus proteus     |
|                         | Diphtheroids         |

**Staining for the Tubercle Bacillus**—The tubercle bacillus may be stained by the slower cold method or the more rapid heat method. In the former the slide of suspected material should be immersed in Ziehl-Neelsen solution of carbolfuchsin for at least one half hour as the cold stain penetrates the bacteria very slowly. The usual method of staining is by placing the slide where it can be kept at a temperature just sufficient to cause the stain to steam slightly. This can be done very well by placing a bunsen flame under one part of the top of the usual laboratory tripod. The slide can be moved to such a position as to obtain just the proper heat and stain should be added as required to keep the specimen from becoming dry. Five minutes of such staining generally is sufficient to color the bacillus a deep red. The stain then is poured off and the slide washed with acid alcohol until no more color comes away at which point it is washed with water and subjected for about thirty seconds to the methylene blue counterstain.

#### MICROSCOPIC INTERPRETATION

**Microscopic Interpretation of Urethral Smears**—The ability to interpret the microscopic appearances of urethral smears is a highly valuable one.

which often comes only after years of careful case study. Aside from those presenting the gonococcus, one rarely can make a safe diagnosis from the stained smear alone. For, as is stated under Nonspecific Urethritis (see page 343), so large a number of urethral discharges are due to pathology not in the urethra alone, that often the appearance of the smear is only suggestive of its cause. Still, it is possible to obtain from microscopic study some highly suggestive facts that often lead to diagnosis.

Smears of urethral secretions, from the standpoint of cytology, can be divided into six groups, as follows:

1. Those in which polymorphonuclear leukocytes predominate or are the only ones present.
2. Those in which epithelial cells are in excess or solely present.
3. Those composed of mucus showing very few cells of any type.

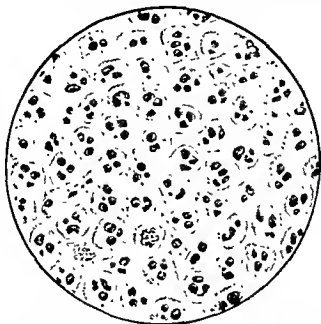


Fig. 82.—Type of discharge commonly seen as the result of chemical irritation of short duration. The absence of bacteria is highly suggestive of such a causal factor.

4. Those composed solely of mucus.
5. Those composed of prostatic secretion.
6. Those composed of semen.

Each of these groups can be recognized at a glance, as well as the smears occupying an intermediate place between the first two, wherein epithelial cells appear in numbers in excess of those found in acute purulent discharges. Late in some conditions fair numbers of eosinophils may make their appearance but they are of no great diagnostic significance.

An intelligent interpretation of what these pictures mean can be arrived at only when one understands something about the reaction of the urethral mucous membrane to various untoward influences. For this membrane has many peculiarities of behavior which, though they may be characteristic of other mucous membranes in some measure, are more prompt and are more easily studied here.

The anterior urethra which is the area from whence most urethral discharges originate is an actively secreting columnar surface. Sexual excitement and some other forms of mild nerve excitation or irritation cause the outpouring of much mucus. Direct irritation to the mucous surface itself causes a prompt outpouring of mucus and polymorphonuclear leukocytes in large numbers. This irritation may be either chemical, instrumental, trauma or due to bacterial toxins. If the chemical or instrumental irritant is severe and long continued the mucous membrane gradually builds up a protective type of cells, namely, squamous cells. These often are produced in such excess of tissue needs that they shed in great numbers. Often they become practically the only cellular elements appearing in the urethral discharge.

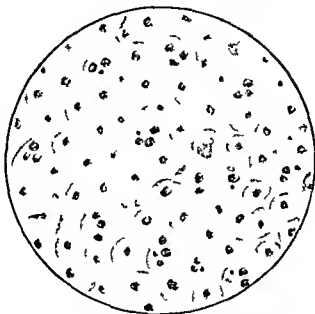


Fig. 83 Smear indicative of prolonged use of chemical irritant. In the desquamative discharge seen from a like cause but long after its discontinuance there usually are bacteria present.

Thus a first glance at a smear composed entirely of pus raises the question: Of what is the urethra trying to rid itself? When epithelial cells appear in numbers the question is: Against what is the urethra trying to protect itself? And the answer to this latter question usually rests in the type of chemical or instrumental trauma to which the urethra has been subjected or in the presence of a tight urethral stricture. For the urethral wall proximal to a stricture usually protects itself from the excessive urinary force by building up a coating of squamous cells.

This shedding of surface cells by the urethra often is a very prompt affair, and it can be used readily as a check upon one's therapeutic efforts. For if a discharge solely purulent at the start begins to show increasing numbers of epithelial cells, one safely may conclude that the treatment being applied is too severe for the particular mucous membrane.

To a more limited degree do we at times gain knowledge of value from

a study of the bacterial flora of urethral discharges. In such studies it must be borne in mind that the normal urethra harbors bacteria of various types. The staphylococcus, diptheroid, streptococcus and the pneumococcus and other bacteria commonly are present. Particularly is the pneumococcus present during influenzal epidemics. Just because one finds a predominance of a particular bacterium present in a given discharge, he is not wise to conclude that it is the cause of it. Seemingly, he is more nearly correct if he concludes that those bacteria are plentiful largely because the thing that ails the urethra makes it a good cultural environment for them. And this apparently applies, even though the leukocytes have ingested suspiciously large numbers of the bacteria.

Commonly, one observes numbers of types of bacteria in the same urethral discharge which, in such cases, is not really due to all of them. At

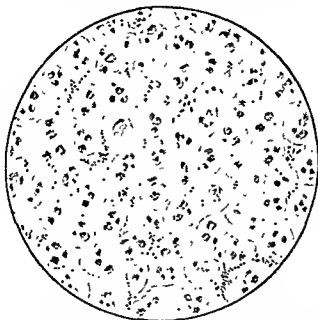


Fig. 84.—Urethral discharge commonly seen as the result of contact with irritative vaginal secretions or secondary to a balanoposthitis.

least, they have not all penetrated the mucous membrane and, if they are a factor in the discharge, they are so merely because their mixed toxins are irritating to the membrane. That this is so is suggested by the urethral discharge at times associated with an unclean preputial sac. For here one not only finds the preputial secretion teeming with a vast assortment of bacteria, but he finds them also in the discharge from the urethra. That they have not caused mucosal penetration, as bacteria that really infect it do, is shown by the speed with which they can be made to disappear as the result of cleansing of the preputial sac without any treatment of the urethra itself.

The conclusions that one may draw from the bacterial flora of urethral discharges are about as follows:

1. The presence of many intracellular staphylococci or streptococci generally means that the discharge is secondary to a deeper lying focus, usually in the prostate gland.

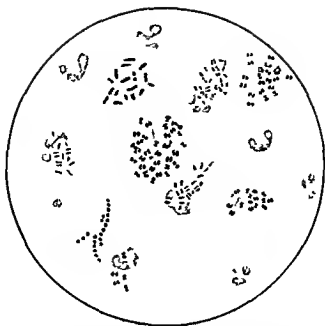


Fig 85—Appearance of the more common types of bacteria found in nongonococcal urethritis. The gram negative diplococci are much larger than gonococci and resemble the large gram negative forms of staphylococci seen in twenty-four hour cultures of staphylococci upon cornstarch agar

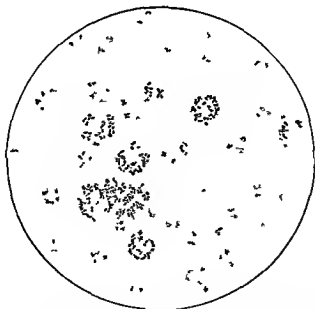


Fig 86—Gram stain smear from urethra of an individual who had never had, and at the time did not have gonorrhea. The bacteria present were staphylococci, some of which had not developed gram positive characteristics and others of which had lost them through partial digestion in leukocytes

2 The presence of diphtheroids in excess is more likely to be an evidence of much urethral devitalization as the result of prolonged chemical trauma

3 The presence of a vast assortment of bacteria may be due to chemical and instrumental trauma, or to a stricture. It just as commonly suggests irritating vaginal secretions or an unclean preputial sac

4 Colon bacilli are rarely found in numbers except in the presence of a marked colon infection of the prostate gland, a decidedly rare condition

5 A profuse purulent discharge containing no bacteria usually is due to a recent highly irritating chemical injection into the urethra

6 A continued mucopurulent discharge containing no bacteria should be searched in the fresh condition for trichomonads. If they are present there are generally great numbers of them in the prostatic secretion where they are much easier to observe

7 A discharge from a urethra showing any area of induration or even the slightest ulceration at or near the meatus should be given a dark field study for the *Treponema pallidum* regardless of any bacteria seen in the stained smear

For further discussion of the phases of the subject not included herein the reader is referred to the discussion of Nonspecific Urethritis

Turning to the interpretation of gonococcal discharges it should be remembered that the same cytologic observations hold. So far as the gonococcus is concerned, little of progressive importance is to be learned from its location in the pus. Active phagocytosis is merely an evidence of the fact that the urethral lumen is rich in opsonic factors. It is no suggestion that curative response is good or poor for phagocytosis is almost absent in the tissue depths where cure really takes place. By the same token a complete absence of phagocytosis of gonococci in the urethral discharge is merely an evidence that the particular opsonic substance was not there at the time, and not that cure is not progressing. Pus from the same urethra may show a very high phagocytic index on the following day. One commonly finds his highest phagocytic indices in the scanty discharges of long standing gonococcal infections—a fact that suggests little curative value in the phenomenon so far as gonorrhea is concerned

**Microscopic Interpretation of Shreds in the Urine**—Unfortunately for a great many perfectly innocent individuals shreds in the urine have borne a bad name for a great many years. Their German name, *Tripperfaden*, or gonorrheal shreds, has been highly instrumental in making them bear this seeming disgrace. For these unfortunates however, there has dawned a brighter day wherein it is becoming rather generally realized that a few shreds in the urine do not give the lie to the one who insists he has never had gonorrhea. Considering that gonorrhea is only one of a number of things that can cause urinary shreds it is high time that their presence should cease to bear such an interpretation. Particularly should this be true with the medical profession for a close study of the question of shreds in the urine following an attack of gonorrhea will show that the patient continues to have shreds more because of the treatment given or not given than just because he had gonorrhea. In other words persisting shreds in such an individual often mean that not only did the patient have gonorrhea but he also had a doctor who either used traumatic treatment or failed to treat the infected prostate gland

The character of a shred is of far more importance than the bare fact that there is a shred present. And the idea that one can tell safely from the size and shape of a shred just what part of the canal it came from is much like the old dream that one could tell from the microscopic study of urinary cells exactly in which section of mucous membrane they originated. The latter is an ultrascientific dream that is not true and the former is almost equally chimerical.

Urinary shreds may be of considerable diagnostic importance when studied microscopically. Not that one can tell the point of origin of them by such study, but that he often can tell the reason for them.

True urinary shreds are due to the coagulation of excreted mucus in which may be, and usually are, entangled a number of cells of one type or another. They vary in size and shape and their weight varies according to the entangled material. Shreds containing no cellular elements, or a decided scarcity of them, float at the top even in urines of moderately low specific gravity. Those containing much cellular material, whether pus or epithelium, or at times urinary crystals, sink rapidly to the bottom of the urine. There are shreds with varying amounts of cells that seem to be undecided whether they should rise to the top or seek the lower levels.

One should be careful not to view as a shred the nebula of mucus that can be seen in any morning urine near the top of the specimen. The same nebula is present after sexual excitement or anything that causes an increased outpouring of normal mucus. It should, likewise, be remembered that as normal urine cools it becomes flecked with little clouds of mucus due to colloidal flocculation and that these are not shreds.

When shreds are examined microscopically they readily divide themselves into four groups. The first is composed of shreds containing mucus alone with no entangled cells. The second group shows nothing but entangled epithelial cells. The third group shows pus and epithelium. The fourth shows pus cells with practically no epithelium. Perhaps even a fifth might be added as the mucus from cystitis sometimes is in large shreds which often have pus, epithelium and urinary salts entangled in them. Usually, however, such mucus comes out as large masses of loose gel that one hardly could call a shred.

As the technic of getting and staining urinary shreds has been considered elsewhere, we here shall confine ourselves solely to the clinical interpretation of their microscopic appearance.

The pure mucous shred which, as has been said, rises to the top of the urine, appears as a homogeneous mass of gel under the microscope. It has no cellular elements in it or, at the most, only an occasional epithelial cell or leukocyte. It takes the stain only faintly if thinly smeared on the slide. Clinically it is of no pathologic importance. It usually bespeaks some mild or fleeting mucosal irritation. It may be present one day and gone the next or it may persist for some time, and it requires no treatment, though the patient may need some psychotherapy to banish the fears it may have engendered.

The epithelial shred, containing no pus, almost invariably indicates that the individual who passed it has had some type of urethral infection for which he has been given strong chemical injections. To protect itself against these insults the mucous membrane has built up a coating of squa-

mous cells. It practically always overdoes these protective efforts and, often, for months, sometimes years, groups of cells desquamate. The condition is made worse by further chemical treatment but occasionally is cleared up by urethral dilatation. More often Nature is the better doctor but, here again, the patient should be convinced of the character of the shreds and of the fact that they are of no real pathologic importance. Urethral stricture also rather commonly causes this type of shred.

Group three is a hybrid sort of affair, a cross between disease and what is being or has been done for it. Its leukocytic content bespeaks inflammation and its epithelial accompaniment warns against the type of treatment. The latter is not due to the inflammation but is due to Nature's efforts to protect herself from chemical or instrumental trauma. It often is of as great clinical importance as the pure pus shred and what is said under that heading should be considered as applying largely to both.

Group four with its burden of pus cells bespeaks inflammation usually of bacterial origin. It is more important than all of the other groups together. One should not, however, lose sight of the fact that group three also is deserving of the utmost respect, particularly if there has been a recent urethral infection.

Pus shreds furnish evidence of one of two things: either a subsiding acute infection or a chronic infection. As gonorrheal or, even, nonspecific urethritis subsides shreds begin to appear in the urine and, if treatment is not of a highly irritating sort, these shreds gradually disappear. If, however, a prostatic infection remains untreated the shreds may disappear and recur or they may not disappear.

In the presence of any type of chronic infection of any portion of the urethra or its associated mucous channels shreds are usual, and they deserve the most careful studying as to their points of origin but, more particularly, as to their bacterial content. The former usually can be determined by the multiple glass test and the latter merits repeated studies for the gonococcus. The practice of telling patients that shreds are of no moment and will disappear if left alone, without preceding such a pronouncement by repeated bacteriologic searches, is unfair. To it can be attributed the gonorrheal infection of many women.

Considering shreds in general there is little need for the prevailing opinion regarding the great difficulty of clearing them up. One has little trouble in doing this as a rule if he carefully studies out the reason for the shreds and gently treats their underlying causes. Most of the failures to succeed are to be attributed to an absence of careful diagnostic work and the use of types of treatment that added insult to injury. Also, there is a prophylactic element in the picture, and one should try to use only those plans of treatment that do not favor shred formation. It is better to be a physician who does not cause shreds than one who tries to clear them up. Many of our seemingly gentle types of treatment favor shred formation if continued in some individuals over any great length of time. One can pick these patients out if he takes the trouble to study their urethral secretions from time to time during the course of treatment. They are the individuals who shed large numbers of epithelial cells.

For many years it has been the custom in the treatment of both post-gonorrheal and nongonorrheal prostatitis to carry out permanganate of



potash irrigations at each prostatic massage. In the presence of the gonococcus or during any urethral discharge this is a wise procedure but, if continued for the months that one usually continues this massage, they are a potent factor in the later formation of urinary shreds in many individuals. Consequently, it is a safer procedure to discontinue the irrigations just as soon as one feels sure the gonococcus is gone or as soon as the urethral discharge has stopped in nongonorrheal cases. It is better, and just as safe in such patients, to have them retain some urine to be voided immediately after massage.

The more one instrumentally traumatizes the urethral mucous membrane the surer is he to have a patient who persistently shows shreds in his urine. And, though gentle urethral dilatation in some cases of long-standing shred formation may have a curative effect, it is easily shown that many such cases have their shreds because too early urethral instrumentation caused local urethral trauma.

**The Microscopic Interpretation of Prostatic Secretion.**—Owing to the utter unreliability of rectal palpation of the prostate gland as a means of determining the presence or absence of infection, microscopic examination of the prostatic secretion becomes imperative if one would learn the real truth. The time has passed when one could disregard seemingly minor grades of prostatic infection. For it has been proved beyond any possibility of doubt that an enormous percentage of such infections are the main foci or one of several foci of infections that have to do with the causation or continuation of many of those more remote conditions which we now classify as being of focal infective origin. Such being the case, the study of the prostatic secretion has become one of the most important procedures in office urology.

Aside from the matter of technic, elsewhere described, much value attaches, therefore, to a thorough knowledge of the microscopic appearance of the normal secretion as a basis for the interpretation of any departures therefrom.

It should be remembered that not all secretions that appear microscopically normal are from normal prostate glands. Apparently in focal infective prostatitis the entire gland is not always involved and, if the infected follicles are not emptied out by the diagnostic massage of the gland, one may obtain only the secretion from the healthy follicles and come to the erroneous conclusion that the gland is normal. Hence, one should be very careful not to pronounce a gland normal on a first study. Many such prostates show ample evidence of infection on a second or third study, provided the studies are within a few days of one another. Parenthetically, it should be said that massage repeated a number of times does not cause the appearance of pus in the secretion from a normal prostate gland. Consequently, the presence of pus on a second or third study is positive evidence that the gland is the seat of deep infection which was not caused to empty its purulent products at the previous study. This has been proved so many times that it stands safely as a clinical fact, though one often hears the question raised.

The normal prostatic secretion is a slightly opaque secretion which, in the fresh state, under the microscope presents a clear background in which float a number of round refractile globules ranging in size from a minute

point up to slightly less than that of the red blood cell. If these so called lecithin granules are so closely packed that they seem to fill the field one

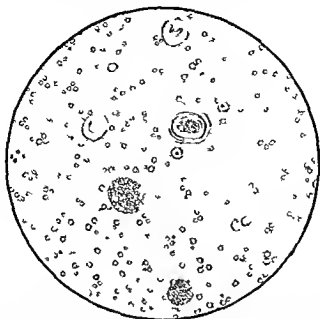


Fig 8 —The microscopic appearance of normal prostatic secretion. The laminated bodies are corpora amylacea. The other large cells are prostatic granule cells. The next smaller are polymorphonuclear leukocytes in normal numbers. The remainder of the field is studded with lecithin bodies which are characteristic of this secretion.

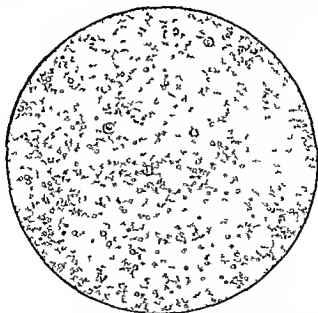


Fig 88 —Prostatic secretion composed almost entirely of granular debris. A restudy within a few days generally reveals a large amount of pus.

may be almost sure that the gland from which they came carries a deep infection which usually can be proved at a massage within four days.

It is common to see in a normal prostatic secretion some large round or irregularly-shaped cells seemingly made up entirely of granules. These granules are round and seem to be exactly like the lecithin granules in the free secretion. So close is their resemblance that one almost feels sure that those in the free secretion must have come from the rupture of prostatic granule cells. Such, however, is said not to be the case. In young patients these granule cells rarely are found in great numbers. After the age of about forty they commonly are present in large numbers. In old men they may be so numerous as to cover almost the entire field. Mucous globules of various sizes are to be seen in most prostatic secretions.

One also may see some laminated bodies of varying sizes, the corpora amylacea, in the secretion. These, also, are encountered in larger numbers

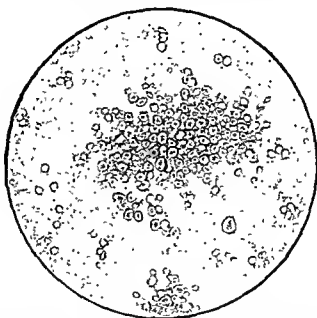


Fig. 89.—Prostatic secretion of a poorly draining infected gland. The scarcity of lecithin bodies in such secretions is very striking. As the leukocytes decrease in number these increase.

later in life. There may be as well some epithelial cells and a few leukocytes. The latter are never present in numbers exceeding five per high-power field in the secretion of the normal gland. Any number above this must be viewed with suspicion and as an absolute proof that further study is needed.

The presence of clumps of leukocytes is an evidence of poor drainage, and one often encounters in the secretions of badly infected prostates enormous clumps of these cells. These enormous clumps usually are made up of cells in a highly degenerated condition in which the outline of the cell wall is hardly visible. In response to systematic treatment of the gland these clumps of pus cells rapidly decrease in size and number so that within six weeks, of two treatments a week, one should expect the disappearance of clumps and find only scattered leukocytes. If such an improvement does not occur, it rather safely may be concluded, in the majority of cases, that

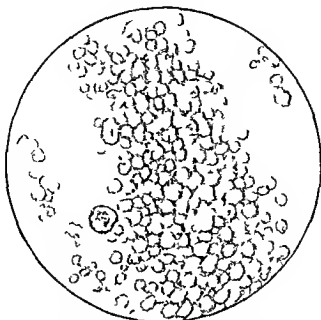


Fig 90—Prostatic secretion from a badly infected nondraining gland. The leukocytes are closely packed, old, and on the verge of disintegration. Lecithin bodies are almost absent.

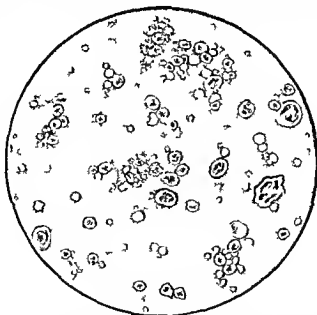


Fig 91 A prostatic secretion showing a slight tendency toward clumping of the leukocytes. Such a secretion is commonly seen and bespeaks poor prostatic drainage. It likewise is an intermediate picture evidencing improved drainage where previously there had been large clumps.

there is either a persisting causal infective focus elsewhere in the body or some other pathology in the posterior urethra. The exceptions occur in those individuals who have had a prostatic infection of long standing which

has caused much glandular destruction. Under such circumstances, a cystourethroscopic study usually will reveal a number of greatly enlarged prostatic openings on the floor of the urethra. At times, these openings are the outlets of enormously dilated follicles surrounded by so much perifollicular induration as to prevent their collapse from tissue pressure. They bear much the same relation to the prostatic infection as does any other thick-walled infected mucous channel to other structures.

Regarding the prognostic importance of reduction of the number of leukocytes per high-power field during the course of prostatic treatments, one should be on his guard lest he think he has been more successful than really is the case. It commonly happens that, toward the end of a course of treatment, one encounters a secretion showing no pus whatever only to have the surprise of finding a large amount of pus at his next study. In fact, he who makes a note of the number of pus cells per high-power field at each study usually will have a queer assortment of figures toward the end of the course of treatments. They often will range from normal to fifty or more per high-power field. Just why this is so would be hard to answer but the most likely explanation is that the few remaining infected follicles do not empty at every prostatic massage, or that some old closed foci have been opened.

As has been mentioned under the consideration of prostatic massage for such infections, one should keep ever in mind the surprisingly intimate association between this infection and infections of tonsils and teeth. Rarely can such a gland be gotten pus-free if such causal foci still persist. And the careful clinician will reinvestigate these distant areas from time to time, particularly if there is no obvious improvement in the character of the prostatic secretion.

Many individuals who have a prostatic infection have much venous engorgement of the posterior urethral mucous membrane. Consequently, the presence of a few red blood-cells in the prostatic secretion following massage is a common finding. Large numbers of these cells mean either that the treatment is done too roughly or that the urethra is too congested to be subjected to much pressure. Under such circumstances, one should avoid pressure on the midline of the gland for a few treatments, stroking lightly only the lateral lobes. In the presence of free bleeding it is best to stop massage for a while and use rectal heat. Bleeding occurring in an individual who has even a mild grade of prostatic hypertrophy should urge even greater caution. Such individuals often have marked varicosities at the bladder outlet and are prone to bleed rather profusely. If their clotting power is low they may continue to bleed for days and, if it is high, they at times form annoying intravesical blood clots.

**Microscopic Interpretation of Seminal Fluid.**—To obtain the semen without some admixture with prostatic secretion is hardly possible. One, however, usually can reduce the amount of the latter if he carefully strips the prostate and has the patient pass some urine before the seminal vesicles are stripped. In studies for the presence of spermatozoa this is of no moment, but it is highly important in efforts to determine the presence of pus in the seminal vesicles. Even after this precaution it is not always an easy matter to make sure that the leukocytes present came from the vesicle.

Usually, when one is able to obtain vesicular contents by digital strip-

ping he finds a viscid gel that varies in consistency and floating in the clear spaces around it is a more limpid fluid made up of the thinner portions of seminal fluid and the prostatic secretion. That the latter is present is easily told by the presence of the characteristic lecithin bodies.

In the presence of prostatic infection one usually finds varying numbers of pus cells in these more fluid areas and there is no positive way in which they can be judged as vesicular in origin. If however he finds many pus cells at various levels in the vesicular gel as he focuses up and down on it he has fair reason to assume that there is an infection of the seminal vesicle from which it came.

As one frequently can segregate fluids from the two vesicles by stripping one and then after the patient has passed some urine the other it often is possible to determine from which side it is obtained. Few diagnostic methods are attended with more uncertainty however and it is rare that one really feels much confidence in his microscopic diagnosis of seminal vesiculitis a feeling which attends to almost an equal degree upon his digital diagnosis of the same lesion.

Studies of the spermatozoal content of seminal fluid usually are done on fresh secretion or at least on secretion that has been kept warm since its emission. One should not expect motility of sperm firmly entangled in vesicular gel but should search the more fluid parts for this purpose. If nothing but gel is obtainable a small pellicle of it may be placed under a coverslip the edges of which are sealed with vaseline. If kept in a warm place for several hours it gradually becomes more fluid and makes motility possible where otherwise there was none. In regard to motility it should be remembered that individuals who have not had an emission of semen for two weeks or longer commonly show no sperm motility. If the same individual expels the contents of his seminal system a day or so after such a study it usually will be found that there is a great amount of motility. It is for the above reason that most diagnoses of necrostermia are in error.

Condom specimens of semen are uncertain things upon which to base a diagnosis of necrostermia. It not infrequently has happened in the writer's experience that such specimens transported to the office under seemingly ideal conditions showed no motility whereas sperm expressed digitally shortly thereafter showed active motility.

In this connection might be cited the case of a prominent internist who for seven years had been told that his sperm completely lacked motility. Many studies of condom specimens had been made and certainly the one studied by the writer was of the same character. The internist was instructed to put some fresh semen under his own microscope within the next twenty four hours and report his observations. This resulted in a telephone call in which he gleefully stated: "They are swimming all over the map." Thus was relieved much marital tension for even the disdainful wife had to admit that she saw motility. Not only were the sperm highly motile but by indulging in sexual intercourse several times a week at his wife's most fertile period instead of once or twice a month as had been his habit he proudly fathered several children.

It is rare indeed that seminal fluid does not contain some deformed spermatozoa and occasionally there are unusual numbers of them. Such abnormal cells rarely if ever show motility though they be surrounded by

normal sperm exhibiting marked motility. Abnormalities are far more common in the tail than in the body of the spermatozoa. Indeed, it is decidedly unusual to see real abnormalities in the latter portion. And, as one compares stained and fresh specimens of the same semen he will be led to the belief that many of the "deformed" ones he sees in the fresh state are not what they seem to be, for he will find few, if any, in the stained specimen.

Spermatozoal form is best studied in stained specimens. Wright's blood stain or Pappenheim's pyronine and methylene green stains give beautiful chromatic differentiations.

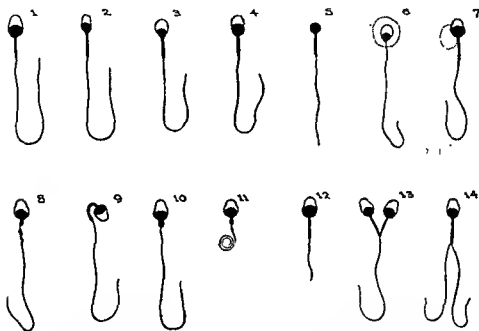


Fig. 92.—Depiction of the many possible types of spermatozoal deformity. (From Herman, after Meaker, *Human Sterility*. The Williams and Wilkins Co., Baltimore.)

In the consideration of sperm counts one does not do well to base his opinion upon an isolated specimen. In many individuals with a limited number of sperm cells, these cells vary in numbers from time to time. Nor does one do well to be too positive about the inability of men who show only one or two sperm after a long microscopic search to cause impregnation. Some years ago the writer, after about a half hour's study found only two spermatozoa in the semen of a highly nervous man. Since that time this man has fathered three children whose paternity no one could doubt.

If specimens of semen are to be obtained, the condom should be washed with soap and water and carefully rinsed with clear water before use, to remove what free chemicals may be present. Even then, prolonged contact with the rubber frequently stops motility.

## THE RULES AND EXCEPTIONS IN UROLOGIC BACTERIOLOGY

The more accustomed one is to the use of the microscope the less conceit does he have about his ability to differentiate bacteria by their morphology alone. Not only is morphology, at times, misleading but one can be equally misled by supposedly typical location and arrangement. Particularly is this true as regards differentiations between the gonococcus, staphylococcus and streptococcus. All three of these types of bacteria reproduce by fission. In other words, they divide transversely and become two separate microorganisms. We say that the gonococcus remains with its flat or slightly concave sides almost in apposition, which is perfectly correct. We further believe that the staphylococcus and streptococcus divide by an indentation starting from opposite sides and meeting in the center in such a way as to divide the particular microorganisms into two spherical bodies, which is almost as often not the case as otherwise. Countless members of these two groups divide exactly as does the gonococcus. And they also show the bad habit of remaining with flat sides in apposition. In other words, they cannot be distinguished morphologically from the gonococcus.

Again, we say that the typical location of the gonococcus is in the polymorphonuclear leukocyte, which, in the main, is true. The same is true many times regarding the staphylococcus, for it is found rather commonly in urogenital discharges within the pus cells, and just as commonly it is of the exact morphology and size of the gonococcus. No eye could tell the difference between them by shape and location alone.

The finding of motile bacilli in infected urines is in no sense rare. Generally, it is of much diagnostic importance to discover whether they are from catheter or air contamination, or are colon bacilli. Shape and motility are poor things upon which to base a conclusion.

One might settle these questions by differential culture media, it is true, but that would require more time than is at one's disposal for every case wherein the questions arise. Science has given us a quicker, though, perhaps, not such an accurate method. However, for practical office purposes it serves well in most cases. When bacteria were built they were not all created with the same biochemical constituents. In fact, in one respect they were divided into two great classes, which, under certain or, perhaps, uncertain circumstances, developed variants which belonged to both classes at the same time. We did not know this until a Danish physician named Gram started giving them a dose of iodine during his staining experiments. It was then discovered that if bacteria were stained with certain dyes and subjected to the influence of iodine, the dye in some became alcohol and acetone fast (gram positive) and from others it readily was removed by either of these substances (gram-negative). Those that were bleached by alcohol or acetone became microscopically invisible so that it was necessary to restrain them with some contrasting color. Thus was the Gram method of staining developed.

When this great discovery was made science began to lay down a lot of hard and fast rules about bacterial stain reactions, some true and some only partially true. Direct statements have a habit of becoming part of a science and, often, it takes years for the world to realize that these so called rules are not universally true. And so it has been with the Gram stain.



There is a rather general impression that bacteria that we speak of as belonging to one or the other gram group invariably run true to form. So far as the truly gram-negative bacteria, such as the *Neisseria* and colon bacillus group, are concerned, this seems to be true. They seldom, if ever, produce elements that show gram-positive characteristics.

With the gram-positive bacteria the story differs. The particular cyto-protein, or whatever it really is, that determines the gram-positive character of bacteria often is not born with them, nor does it always stay with them to death and after. Gram-negative elements of "gram-positive" bacteria are common, particularly with staphylococci and streptococci. Frequently, they abound in young cultures or cultures upon certain types of media. Even more frequently, old cultures lose their gram-positive characteristics, and practically none of the autolytic or shadow forms of these cocci are alcohol or acetone fast.

Under such circumstances, one readily sees rather a sad state of affairs for the urologist. Bacteria that abound around the urogenital tract, normal or diseased, not only may be identical in morphology but they may have the same staining characteristics. In other words, fission forms of both the staphylococcus and the streptococcus may be gram-negative. Also, they may be in the polymorphonuclear leukocyte, as is the gonococcus. However, so far as the matter of diagnosis is concerned, one who is aware of these conditions rarely has any great difficulty in distinguishing the cocci which should be gram-positive and are not, from those that should be gram-negative and are. True, if a stain variant in fission form happens to be away off by itself one really cannot tell whether or not it is a gonococcus. Fortunately, this is rarely the case. These misleading bacteria usually huddle together and, though there may be gram-negative elements, they usually are in clusters of gram-positive cocci.

The same is usually true of gram-negative elements of intracellular cocci that should be gram-positive, they are in among gram-positive ones. In such clusters one usually sees, among a larger number of definitely positive cocci, gram-negative ones of varying sizes and dye intensities. They vary from small, isolated, deeply-staining cocci, on through the various sizes and shapes that cocci assume to the faintly-stained shadowforms that have been partially digested by the leukocytes. It is to be recalled that the intracellular gonococcus takes the counterstain deeply and holds it. There is much reason, however, to believe that the administration of sulfanilamide does cause intracellular digestion of gonococci.

And when it comes to the question of microscopic differentiation of cultures of these bacteria, it often is a matter of great uncertainty. At times it can be done only with the most prolonged and carefully carried out plating methods, and even then errors are common. One has little difficulty in proving that he has a pure culture of gonococci. The trouble comes when he has a mixed culture of gonococci. Staphylococci and streptococci grown on the enriched medium necessary for gonococcal culture frequently develop a number of gram-negative elements that look exactly like the gonococcus. True, one can prove some things by transplanting the growth to some medium on which the gonococcus will not grow, but, even then, he has not proved that the gonococcus was not present in his original culture. If he does this he must carry it through more than one subculture for, often, the

gonococcus will grow for one generation on even plain agar. Because of all of this difficulty with mixed cultures, it has been almost impossible to use cultural methods as proofs of cure until recently. The task, even now, is not one for the bacteriologic tyro.

The more recently devised cultural methods wherein gonococcal colonies are readily differentiated in plate cultures by allowing a 10 per cent solution of tetramethyl para-phenylene diamine hydrochloride to flow over them has changed the picture greatly (the oxydase test). They have made cultural studies even more reliable as proofs of cure than are direct smear methods. One would not, however, belittle the great bacteriologic skill required even in the carrying out of this more refined technic, and it probably will be some time before it reaches a state of great reliability in the hands of most bacteriologists and laboratory workers.

If there is one thing that seems fixed in the general medical mind it is that staphylococci arrange themselves like bunches of grapes and streptococci arrange themselves in long or short chains. We were taught this in our bacteriologic courses, and we consider it one of those settled things of the science, to dispute which were heresy. Well, the writer is not so sure about all of this as some of his bacteriologic friends seem to be. In fact, he has some doubts about the correctness of some of the diagnostic work that has to do with the pronouncement of one bacterium being a staphylococcus and another being a streptococcus. To be honest, he has reached a point where he does not know a staphylococcus from a streptococcus in ordinary cultures.

It all came about in this way. For a number of years he cultured prostatic secretions on slants of agar and like media, and the smears from the slants when stained showed the beautiful "bunches of grapes" as a good staphylococcus should. He did not see any chains to suggest there might be any streptococci present, and he felt blissfully satisfied that one thing definitely was true, viz. Almost all chronic prostatic infections were caused by the staphylococcus. Just about the time that was settled in his mind he read that the Mayo Clinic bacteriologists did not agree with him. They said that streptococci caused the majority of such infections. Knowing that something must be wrong with one of these opinions, and, having much more confidence in the likelihood of his contradictors being correct, he set out to prove himself wrong with some very amusing results.

It seemed that they used a liquid medium instead of a solid one, and it was a simple matter to get one that rather closely resembled the one they used. When everything was ready a tube of brain heart infusion (Difco) was inoculated with a drop of prostatic secretion from a case of focal infective prostatitis. At the end of twenty-four hours a pipette was passed into the medium and, as carefully as possible, some medium from near the bottom of the tube was allowed to flow into it and very gently was spread on a slide and stained. The result is seen in figure 93 S1, and to one who was used to getting beautifully arranged "bunches of grapes" it came as a shock. It aroused a great curiosity to learn what a subculture on a slant would look like under the microscope. The result of this as is shown in figure 93, S2, registered another shock. This was tried again and again and, though the results were not always so striking, they yielded the same thought—liquid culture medium, chains, and solid medium clumps (Fig. 93, K1 and 2).

It would hardly do to stop at this, for one might be dealing with a mixed culture of staphylococci and streptococci, each growing most luxuriantly on a given medium. A number of times the tests were carried out in series of three: liquid, solid and then again into liquid medium.

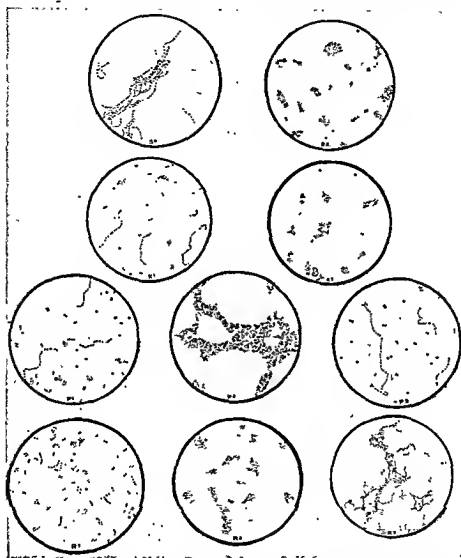


Fig. 93.—Drawings of microscopic fields from cultures of prostatic secretions on liquid and solid culture media. Those fields marked with the same letters were cultures and subcultures from a given case. Those marked number 1 were initial twenty-four-hour cultures in liquid medium. Those marked number 2 were subcultures of number 1 on a calf's brain agar slant. Those marked number 3 were subcultures from the slants to liquid media. Between numbers 2 and 3 the bacteria were grown for twenty-four hours on old dry agar slants. (Each horizontal row represents a different patient.)

One time one would get long chains in the first liquid culture and short ones in the second and, as often, conditions would be reversed.

To try still further, some were run in a series of four cultures, all of twenty-four hours. First, on liquid medium, then to a solid slant, then to

another slant of medium so poor that no self respecting streptococcus should grow upon it, and then back again in the liquid medium. The results did not differ. Long or short chains predominated in the liquid medium and practically nothing but clumps on the solid (Fig 93 P<sup>1</sup> and 3, R<sup>1</sup> 2 and 3).

Reaching the conclusion that he really did not know the staphylococcus from a streptococcus the writer checked with some of his bacteriologic friends. He would take a series of slides from the test wherein four cultures were used and ask these teachers what they were. Invariably those slides from the liquid cultures were pronounced long- or short chain streptococci as the case might be, and those from the solid media were pronounced staphylococci. The judgments were immediate, there was not the shadow of a doubt. When told what the matter was all about they had not much more to say. Some mentioned something about wishing to see them on 'differential media' before answering positively, though they just had answered it positively from the microscopic observation of the smears. Some mentioned the fact, known to every one who has done much bacteriologic work, that with staphylococci one commonly finds short chains in the water of condensation of solid slants of medium. Some seemed sad over having one of their basic points so rudely shaken.

The whole experience brings up several rather important clinical questions. Just how often do bacteriologists run such bacteria through a course of 'differential media' before reporting either a staphylococcus or streptococcus? How many thousands of gallons of staphylococcic vaccines have been used for streptococcic infections and the reverse? What is the real difference between the two? Dare one say that because he finds cocci arranged in short chains in body discharges he is dealing with streptococci? He can get the same thing from the water of condensation of a slant culture of so called staphylococci or he can put the same bacteria into a liquid medium and get short and often long chains. Finally, just how sure can we be that some other seemingly settled basic bacteriologic facts are always facts?

Some really pertinent doubts also might be raised about the general view regarding the colon bacillus as so common an originator of purulent infections of the urogenital tract. Often we are a bit too easily satisfied with our bacteriologic findings. We find what we feel certain is the colon bacillus and consider the question settled. We often would do far better for diagnostic urology and the patient if we viewed the colon bacillus as one that rather commonly hangs around the premises while some more dangerous bacterium does its work—a sort of smoke screen to fool the diagnostician.

The more one studies the activities of the colon bacillus about the urogenital tract the less seriously will he take it as an etiologic factor in disease. If it comes from the upper tract and is associated with pus he often would do better to make a careful search for the tubercle bacillus rather than to conclude that he was dealing with a colon bacillus pyelitis, a thing that probably is decidedly rare in the absence of pelvic stagnation. If he finds the colon bacillus in large numbers in the freshly voided urine in the absence of pus there may be some residual urine or a badly acting colon.

Occasionally (just about once in five years in a busy office and dispensary practice) one finds a true colon bacillus infection of the prostate gland and evacuates by digital pressure large amounts of foul smelling pus containing

many gram-negative bacilli. And we need not take the colon bacillus so seriously here, for there is little chance that it really started the prostatic infection. It probably just came along after some other bacterium started things, and decided it was a good place to stay and try to make itself look important.

So, all in all, one often does best to think of the colon bacillus in terms of colon and then urogenital-tract stagnation. Patients, seemingly in perfect health, may excrete colon bacilli by the billions in an otherwise perfectly normal urine. More patients excrete smaller numbers during times of bowel irritation or constipation and still more pass a few from time to time. Thus, when we see the colon bacillus occupying a place of seeming distinction in the lists of the bacteria found in urethral secretions, urine or prostatic fluids we commonly can do a generous lot of discounting, if there is no urinary stagnation.

Surely no near-critique of things urologicobacteriologic would be complete if the smegma bacillus were forgotten. Somehow or other, this bacterium gained a wide reputation for fooling bacteriologists. It was not so very many years ago that urologists and others had the idea that the tubercle bacillus rarely found its way into the urine, even in advanced renal tuberculosis. Even when someone found a tubercle bacillus he had a good chance of being laughed out of court as having mistaken a smegma bacillus for it. The clinicians in those days were a sure-minded lot, particularly the internists, who insisted they had cured renal tuberculosis by nonsurgical means. And there were many such fifteen or twenty years ago. Some one had told them that the smegma bacillus was acid-fast and could not be told safely from the tubercle bacillus in urine, and they believed it. The belief has continued to filter along. It often has served as a salve to the conscience of the tired laboratory worker who reasoned that it was not much use to spend long periods of search for a bacillus that might be doubted when it was reported.

Laboratory workers grew to place five- and ten-minute standards for the microscopic study for the tubercle bacillus and, if one was not seen within that time, the report was "negative." One who has done any real searching for the tubercle bacillus in urinary sediments knows how fortunate he is when he finds the thing he is looking for quickly, and he readily can recall that many, many times he found the tubercle bacillus only after far longer periods of searching. He soon develops the conviction that if the pus contains no other bacteria there must be a tubercle bacillus in it somewhere. If not that day, then on some other, and, if there are other bacteria, he may find a tubercle bacillus, particularly if there are colon bacilli.

One who will take the trouble to smear a number of samples of smegma on slides and stain them as he would the tubercle bacillus is sure to wonder how the idea first got started. He will find bacilli containing polar granules that are acid-fast, some containing three or more acid-fast granules and the like. But he will find that the body of the bacillus takes the blue counter-stain, a thing the tubercle bacillus never does. And, if he compares the two bacilli, it never will enter his mind that there is much danger of confusing them with one another.

The real truth of the matter is that one familiar with the appearance of the different types of the tubercle bacillus will not find anything in urinary

sediment that would confuse him greatly, no matter how he collects his urines. If he finds deeply staining solid or beaded bacilli he need have no doubt regarding their being the tubercle bacillus. But one does not condemn kidneys on the finding of tubercle bacilli alone. He goes through a lot of highly accurate diagnostic procedures before he advises operation. Hence the finding of tubercle bacilli in the urine though a finding of the utmost importance, is only a part of the clinical picture. Even if one could be confused by a *singegma* bacillus, the search for tubercle bacilli in the urine still would be worth far more than the time and trouble it costs.

#### UROGENITAL CULTURE PRECAUTIONS

While the obtaining of cultures from the readily accessible portions of the urogenital tract is a simple matter the same simplicity does not obtain when one is concerned with the less accessible portions of the tract. Particularly is this true of the deeper portions in the male and it is almost equally so of the urinary tract in the female.

In both sexes the urethral canal is the natural habitat of quite an assortment of bacteria and their complete removal is in no sense an easy matter. In the female it is not possible to carry out urethral washing as it is with the anterior urethra in the male, though even here such efforts are not always to be relied upon too fully. Thus, in both sexes it is well to make some allowance for bacteria pushed into the bladder by the catheter. There is much value in discarding the first portion of the catheterized urine and using only the last portion obtained. By so doing many of the urethral bacteria are washed from the catheter and but few colonies of such bacteria would appear upon either slant or plate cultures. The most common is the *staphylococcus* and it probably is wise to disregard any cultures that show but a few colonies of this bacterium. It abounds in almost every urethra and is almost impossible of removal. Further a really infected bladder or upper tract should give a profuse growth.

In the male, urethral contaminants can be reduced by injecting a bactericidal solution into the anterior urethra and holding it there for at least five minutes. It is not possible to cleanse the posterior urethra in this way, because fluids injected into it immediately flow back into the bladder. Thus, one may have to deal with contaminants from prostatic infections in his catheterized urine specimens. Such contamination can be reduced somewhat by the passage of some urine by the patient immediately before the passage of the catheter. The same precaution is equally applicable to the female.

Efforts to reduce such contamination by copious irrigation of the anterior urethra in the male with potassium permanganate solutions frequently results in the presence of air borne bacteria that overgrow everything in the culture.

The ability to eliminate such cultures as show but a few colonies does not apply to cultures in liquid medium, for which reason it is always best, if one is using liquid medium to run a control slant culture.

While urethral contaminations are common in catheterized bladder urines they cannot be altogether overlooked in catheterized kidney urines. For unless one plugs the outer end of his ureteral catheters to reduce the

entrance of bladder urine as the catheter passes through the viscus, he is very prone to vitiate his results. Under the most careful technic it is probable that a drop or more of bladder urine always enters the catheter in its passage. Thus, it is always wisest to allow a good quantity of urine to flow through the catheter before obtaining a portion for culture. Even then, a few small colonies should be disregarded as they probably are true contaminants.

In the study of the prostatic and seminal fluids in the male one always is wise to question sparse growths. The patient should empty his bladder with considerable force to flush out the urethra. The fluids may be obtained by digital stripping of the gland and immediately cultured, or the urethra may be cleansed further by an antiseptic. If this is used, care should be taken that the urethra entirely empties itself before the fluids are expressed, as even a small quantity of the antiseptic may exercise a marked bacteriostatic influence.

Several more difficult procedures for avoiding urethral contamination have been devised but they are open to the same faults and probably are not even as good as those mentioned above.

In obtaining cultures from the more accessible portions of the female tract, such as the urethra, cervix, vulva or vagina, it is well to remove surface material and obtain the cultures direct from the membrane itself. This is particularly true of cervical cultures, as the cervical plug is of such a high degree of alkalinity that some of the deeper bacteria, particularly the gonococcus, do not thrive in it. Not only should this plug be removed, but the cervix should be compressed forcibly to express secretion from the glandular structures. In the male it is only necessary to cleanse the urethral meatus to eliminate preputial bacteria.

## CHAPTER III

### GENERAL DIAGNOSTIC METHODS

#### INSPECTION

THE tendency of those in special practice to disregard the patient as a whole and proceed immediately with the examination of the particular system in which they are most interested is a distinct misfortune. This most commonly is a fault of those who have had no general practice experience prior to engaging in their particular specialty. Deep interest in one portion of the body even engenders the same habit in those who have had the advantages of the broadening influences of general practice.

Inspection should mean primarily a visual study of many things—an estimation of the patient as a human being. It should include a study of facial expression so far as it registers well being or disease, posture, deformity, respiratory movements, skin surface and gait. Locally, it should concern itself with size of the penis and scrotum in fact any visible departures from normal.

#### PALPATION

In urology palpation means almost as many things as it does in gynecology for it implies both external and internal digital examination. The determination of the size and mobility of kidneys, the presence of abdominal tumor or inflammation, the condition of the inguinal rings, scrotal contents, penis and its integument, the size, contour, consistency and mobility of the prostate gland and seminal vesicles and a search for infections of Cowper's glands. All are parts of a careful examination of the urologic patient.

Seldom however is palpation alone sufficient foundation for the establishment of an accurate diagnosis. Tumors which one is sure are renal rather commonly have nothing to do with the kidney, kidneys that cannot be felt are as often pathologic as are those that can. Scrotal tumors which palpation says are one thing commonly are something else. Prostates of normal size frequently have hypertrophic lobes pushing into the posterior urethra or bladder, what seems to be prostatic tuberculosis may be carcinoma and what seems typically carcinoma may be tuberculosis and a seemingly pathologic seminal vesicle may be just a full one. In other words, palpation is just another of those immensely important diagnostic aids which like inspection more often point the direction of further study than answer the question safely.

**Renal Palpation**—One who carries out renal palpation should have clearly in mind its possibilities for error and view it solely as one factor in a urologic study. He should be firmly of the opinion that a diseased kidney is not always palpable and a palpable kidney is not always a diseased one. He should remember that a certain amount of mobility is normal to every kidney, particularly on the right side and that many kidneys that seem



unduly mobile, particularly in thin people, are not diseased and very possibly never will be. He should bear in mind that in destructive kidney conditions one more often can palpate the hypertrophied good kidney than the one undergoing destruction. He should know that some people have sensitiveness in the costovertebral angle in the absence of infection and that, upon rare occasions, it is unilateral. Also, he should remember that some patients have only one kidney and, if so, it is a large kidney that may be palpated with ease. Further, some perfectly healthy kidneys are of the horseshoe type and may be almost in the pelvis.

The carrying out of kidney palpation must be started by gaining the confidence of the patient with the assurance that it is to be done with the utmost gentleness. For worthwhile renal palpation requires, above all things, muscular relaxation on the part of the patient, and frightened, apprehensive patients do not relax. Such an examination frequently requires that the patient be placed in several positions. It is well to start

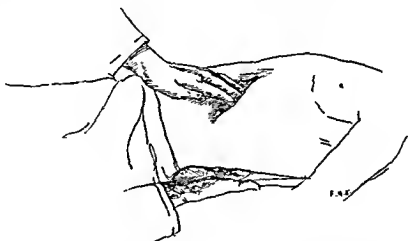


Fig. 94.—Bimanual method of palpating the kidney. The lower hand pushes up the subcostal region while the upper hand pushes in the anterior belly wall as the patient exhales.

with the patient lying on the back with the thighs slightly flexed on the abdomen. The entire abdominal wall should be palpated gently at first, to elicit any information it may give as well as to gain the patient's confidence. He then is instructed to breathe rather deeply with his mouth open, when the pressure is gradually increased until the anterior abdominal wall is carried down as deeply as possible without hurting the patient. Having thus discovered or eliminated muscular rigidity and abdominal masses, a distended bladder or the like, the tips of the fingers are carried downward in the upper abdominal quadrants and the patient instructed to take a very deep breath and gently expel it. Having learned all that this manipulation can unfold, the fingers of the other hand are placed posteriorly in the costovertebral region and, with the anterior fingers pressed toward the renal fossa of the same side, the posterior fingers are pushed sharply into the tissues of the back while attention is given to sensations imparted to the anteriorly placed fingers (Fig. 94). This method of ballottement fre-

quently will reveal the presence of renal enlargements that otherwise would escape the palpating fingers

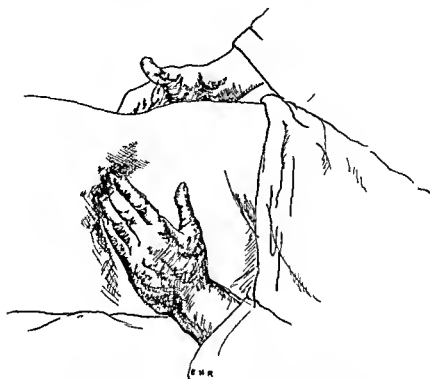


Fig 95—Renal palpation with the patient lying on his side



Fig 96—Renal palpation in the sitting position

At times, it is wise to place the patient on his side with the thighs sharply flexed upon the abdomen and more commonly, particularly in thin patients,

information of importance is elicited by changing the patient from a dorsal to a sitting posture while the fingers are pressed into the upper anterior quadrant (Figs. 95 and 96). Rarely is it possible to carry out satisfactory palpation of the renal regions with the patient standing.

**Palpation of the External Genitalia.**—Much information is gained at times from careful palpation of the scrotal contents and the penis. In palpating the penis one should search for areas of induration in the corpora cavernosa and in the corpus spongiosum. The prepuce should be retracted if possible. If not, it should be palpated carefully for areas of induration.

Palpation of the scrotal contents should reveal the presence or absence of such things as varicocele, hydrocele, spermatocele and tumor. The testicles and epididymides should be mapped out carefully as to size and relation. Not only should it be determined that the testes are in the scrotum, but the presence or absence of rotation and, even the possibility of it, are of great importance.

The finger should be passed up into each inguinal ring and the patient instructed to cough forcibly to determine the presence, absence or likelihood of hernia.

The spermatic cord should be palpated from the epididymis to the inguinal ring. In doing this it is wise to hold the cord at tension by pulling down slightly on the testicle. The thumb and index finger then should be stripped along the cord from below upward. In this way small nodulations that otherwise might escape notice are felt easily.

**Rectal Palpation.**—Rectal palpation can be carried out with the patient in any position that allows of the insertion of the examiner's finger through the anal sphincter. Some of these positions, however, are not ideal for a free digital study and are only to be used when a patient is too sick or crippled to assume a more advantageous position for the physician. The most convenient position for the patient and the physician is for the former to assume a "leap-frog" position, leaning forward with the hands on the knees or on a chair. The knee-chest position, however, makes it possible for the examining finger to reach higher into the pelvis.

In order to carry out such an examination the physician should wear either a rubber glove or a finger cot with a rubber cape (Fig. 145) anointed preferably with a water-soluble lubricant. The writer uses 1 per cent aqueous carbolic acid solution in which is enough powdered tragacanth to make a thick paste. The finger should be passed very slowly and gently through the anal sphincter with its palmar surface upward and gently swept entirely around the rectal wall to note any palpable change in it or in the hollow of the sacrum. It then is rotated and passed over the entire surface of the prostate gland and up over the seminal vesicles. In order to reach as high as possible the flexed external fingers should be pushed firmly against the perineum.

The pain of this procedure should be nil in the absence of anal narrowing or infection. In their absence pain generally means roughness on the part of the examiner or apprehension on the part of the patient. It is well to remember that almost every prostate gland that has not had a long course of massage is sensitive to pressure and that one should not place too much importance upon seeming hypersensitiveness at the first study.

In estimating the normal or abnormal size of the prostate, one should

keep constantly in mind the most common pitfalls. There are few procedures in which more errors are made.

For so many years we have said that the prostate gland is about the size and shape of a horse chestnut, never mentioning that even they come in many sizes and the physician's idea of normal size commonly is his memory of the last horse chestnut he saw. Consequently, any prostate that happens to feel larger than that particular standard is likely to be considered enlarged. If the patient is young, he must have an inflammatory



Fig. 97. Method of palpating Cowper's glands.

enlargement if he is beyond fifty, he must of necessity have true hypertrophy. If one lobe feels larger than the other it must in the opinion of the physician have some gross pathology in it. He does not stop to think that by the nature of things the left prostatic lobe is usually larger than the right to a right handed examiner while a left handed examiner is sure that the reverse is the case on the same prostate. Further many normal prostates do not in the least resemble a horse chestnut either in size or shape. A large percentage of such glands are almost flat in their posterior

surfaces and their lateral lobes extend far upward, with a deep notch, superiorly in the midline.

Usually, the large, heavy-framed individual has a large prostate and the small, thin man has a small gland and, again, neither may be the case. Usually, the gland in youth is small, at forty it is twice as large, and at sixty it frequently is half as large again without being the seat of hypertrophy. On the other hand, if for a long period it has been the site of a chronic inflammation it may grow perceptibly smaller throughout the years.

It thus will be seen that, in regard to size and contour one must take into consideration many things, so many, in fact, that he will find himself thinking of what is normal to an individual of the size and age who is examined by a right- or left-handed man.

Sometimes the seminal vesicles can be felt and often they are so closely attached to the prostate that a line of demarcation cannot be demonstrated. At times one may be greatly aided by bimanual palpation, particularly in the discovery of pelvic tumor.

While the finger is in the rectum its tip should be passed down the surface of the pubic bone a little to each side of the midline until it drops into the fossa bounded by the descending ramus of the pubic bones, the membranous urethra and the transverse perineal muscle. The tissue should be grasped firmly between the intrarectal finger and the thumb and gently rolled between them to discover if Cowper's glands can be felt, which is not the case with the normal glands (Fig. 97).

### ROENTGENOGRAPHY IN DIAGNOSIS

Roentgenology has been one of the greatest of diagnostic advances so far as diseases of the urogenital tract are concerned. But, like all great blessings, it is not without its faults. The tendency to view it as almost a finished art and to place unbounded credence in its shadowgraphs, often to the exclusion of other easily elicited data, has led to countless unneeded operations. Viewed, as it usually should be, as only a part of a clinical study, it is of inestimable value. Even in its most positive phases, the demonstration of urinary stones, it seldom tells but a part of the story and in its less positive spheres it may mislead grossly.

Since the advent of intravenous urography there has been a widespread tendency to view it as the court of first and last resort in urologic diagnosis. Physicians, whose knowledge of other things was far better based, have sent their patients to roentgenologists whose experience in such things often was far too little for the rendering of diagnoses of such certitude as commonly were given from the faint shadowgraphs so often obtained. And thus has a most remarkable advance been marred to such an extent that, though the matter of roentgenography and its technic are more fully discussed elsewhere, it will not be amiss to point out in this place some of the more common pitfalls, particularly those that have to do with this sudden rush toward intravenous urographic studies (Fig. 98).

There is a by no means narrowly held opinion that this newer form of study has a far wider and more positive value than is, in reality, the case. It is not generally realized that many of the films thus obtained

are of a highly misleading nature to even the most experienced of roentgenologists. Despite this men of but meager experience with the interpretation of such films are misleading themselves and others. The writer has encountered much of this particularly in the hospitals in smaller communities. Not infrequently he has been called upon to carry out cystoscopic studies upon patients upon whom a urographic diagnosis had been made from films which no one of wide experience with such things even would have tried to interpret. Upon several occasions entirely unnecessary operations had been performed on the strength of diagnoses thus based and the writer has been able to demonstrate that the other kidney was the diseased one. The roentgenologist had been misled because of the size of the good kidney that had undergone a compensatory hypertrophy and was working at such speed that it diluted the opaque solution more than did the slowly acting diseased one.



Fig. 98. Roentgenograms of the same patient showing how grossly one may be misled by intravenous urography. On the left is a urogram showing absence of function in the left kidney. In the center is a retrograde pyelogram of the left kidney. On the right is a repeat intravenous urogram showing active function of both kidneys. (Courtesy of Drs. Francis Borzell and M. T. Woodruff.)

It has been the author's privilege to attend in his own hospital many radiologic seminars at which the urograms of the previous week were studied by both the urologic and radiologic staffs. Both have been studying films for years and certainly no one could sit through one of these conferences and feel that the subject had reached a high degree of scientific fixity. The urologists carefully trace out what can be seen of the shadows cast by pelves, calices, ureters and bladder; the positions of the upper tract shadows in both the recumbent and upright positions; and they try to estimate renal function by the density of these shadows. Often they show the roentgenologist some things he has not seen. Then he takes his turn and commonly points out so many things the urologists have not seen as entirely to change the diagnosis they so carefully have constructed. So commonly does one or the other fail to observe something of importance that one is forced to the conclusion that urologic films, no matter what their type, are best studied by both together than by either separately. Indeed

it is the custom of urologists of the widest experience to insist upon such teamwork.

From the perusal of textbooks and articles upon urologic roentgenology one is prone to come to the conclusion that the entire matter has been

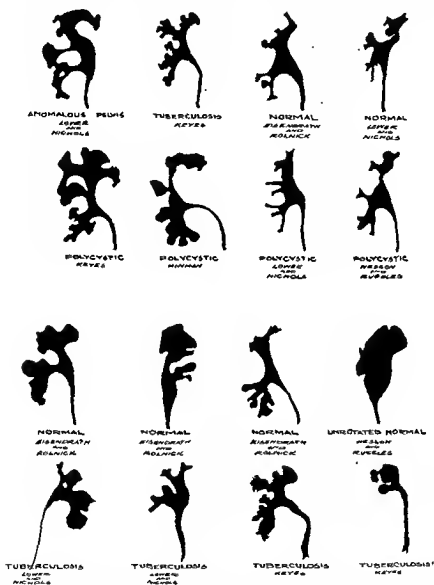


Fig. 99.—Blocked outlines of pyelographic studies from the works of various authors to illustrate the confusing shadows so commonly obtained. The upper row of each set was pronounced either normal or anomalous. Below each is a somewhat similar shadow with the diagnosis of the author. Certainly no one could study these and continue to feel that pyelography should stand alone as a means of diagnosis in many cases.

reduced to an attractively exact science. And the degree of positiveness so common to roentgenologic reports does much to further foster such a belief. However, if one will take the trouble to compare one author's "normal pyelograms" with another's "abnormal" ones he is likely to find

himself in a rather wide sea of confusion. Also, he is likely to make a few resolutions against placing much too much reliance upon some of the reports he may get upon such studies and to conclude that from then on he will view these studies as only a part of his diagnostic efforts. To illustrate this point the writer has had made the drawings in figure 99 taken from the works of some of our greatest authorities upon urography. Surely no one can study these and feel that he is dealing with an attractively easy and fixed means of diagnosis.

So much for the negative side of the matter. On the positive side rests a diagnostic means that settles so many doubts that it seems almost unfair

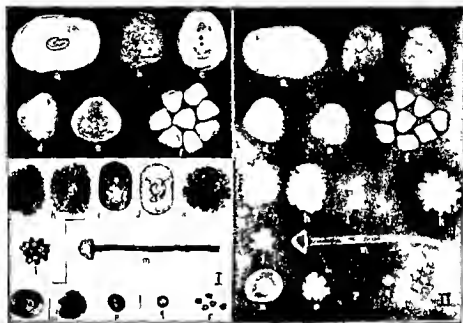


Fig 100—Different stages of radiopacity of vesical calculi. I a Calcium phosphate b, uric acid c cross section of b d outer layer of calcium phosphate and nucleus of calcium oxalate and phosphate e, cross section of d f calcium oxalate carbonate and phosphate g calcium oxalate h cross section of g i uric acid with small amount of calcium oxalate j cross section of i k and l calcium oxalate m calcium phosphate deposits on a mushroom catheter n calcium phosphate o calcium oxalate p uric acid q calcium oxalate r calcium oxalate trace of uric acid II x Ray shadows cast by each of the above (Young and Waters From Human Principles and Practice of Urology W. B. Saunders Co., Philadelphia)

to utter even a word of warning against too full a reliance upon some of its findings. In the diagnosis of urinary calculus it is unsurpassed by any other procedure and, yet even here it fails in approximately 20 per cent of the cases.

Except perhaps in suspected stone with all its great value roentgenography seldom should be the first means of diagnosis. Mainly its value falls in the sphere of placing one in a position to better interpret his other findings and as most of these things are considered herein in their appropriate places there is little need now for further elaboration.

Cystography—Perhaps the most ardent advocate of the value of cystographic studies of the bladder has been Pfahler who for years has carried



out this procedure, by filling the bladder with air, in his study and treatment of vesical tumors (Fig. 101). Though he has had little difficulty from the injection of air into the bladder for such studies, there are some for whom grave emergencies have occurred while using it and, for this reason, it is in far less use by urologists than are such studies made by means of the distention of the bladder with radiopaque solutions.

By either method it is possible to demonstrate intravesical prostatic protrusions, diverticula, the vesical irregularities due to the cellulation of back-pressure, ureteral reflux, the filling defects caused by new growths, radiolucent calculi and many other abnormalities of the middle and, at times, the upper urinary tract.

Air dilatation of the bladder should be done only through a urethral catheter, and the greatest care must be exercised regarding the amount of pressure used. While it is general custom to use a catheter for the introduction of radiopaque fluids into the bladder it is by no means neces-

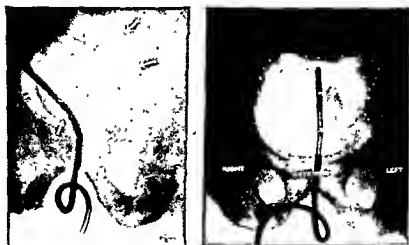


Fig. 101.—Aerocystograms showing filling defects caused by vesical tumors. (Courtesy of Dr. George Pfahler.)

sary to do so, as the bladder often can be filled more safely and more comfortably by means of hydrostatic pressure in the same way that intravesical irrigations are given.

In the study of the size, number and emptying possibilities of diverticula, cystography by the use of radiopaque fluids is invaluable. In the study of the back-pressure influences of urethral obstruction in children and in adults it has a like value.

The directions from which exposures are made is a matter of great importance in such studies. It is necessary to take them from several angles in many cases if the greatest diagnostic accuracy is to be courted. Particularly is this so in a study of diverticula and the filling defects caused by vesical tumors.

It also is possible to gain much information in those patients who have vesical outlet obstructions in whom, for one reason or another, cystoscopy is inadvisable. Valuable information also can be obtained cystographically

by the intravenous injection of one of the solutions used for excretory urography

Where cystoscopy is not contraindicated, it usually is possible to gain far more accurate knowledge of these conditions by a visual study of them. This fact serves as a decided limitation to any great need for cystographic studies where a skilled cystoscopist is available.

**Urethrography**—Studies of the caliber and contour of the urethra by means of roentgenograms taken during the injection of opaque fluids into the bladder by way of the urethra upon rare occasions, demonstrates pathologic lesions that otherwise are prone to escape discovery. By such a procedure it not only is possible to reveal such things as urethral stricture, false passage, fistulation, urethral diverticulation and the like, but it often is possible to demonstrate intravesical intrusions of the prostate where cystoscopic study is inadvisable or impossible.



Fig 103.—Urograms. *A* Urethral stricture at *S*. The medium has passed into the ducts of Cowper's glands showing the glands with some fluid apparently escaping into the tissue of the remains of an old abscess cavity. *B* A filiform urethral stricture with marked urethral dilatation behind it. *C* A urethral stricture at *S* with marked dilatation of the prostatic follicles. (Courtesy of Dr. M. L. Brodney.)

One of the most important considerations for good urography is that the patient be placed in such a position as to afford as near a lateral view of the tract as can be gotten without the interposition of the bony structures. This can be done best by placing him in a posterolateral position with the lower thigh partly flexed on the abdomen and the upper thigh rotated outward as far as possible. When the proper position is obtained an imaginary line passing through a point about 2 inches from the symphysis pubis on the side of the upper thigh, falls just posterior to the femur of the lower leg.

The medium most commonly used because of its inexpensiveness is 12 to 15 per cent sodium iodide solution. The much more expensive lipiodol has definite advantages in the study of vesical outlet obstructions. It floats on water and with a quantity of residual urine in the bladder, it is possible, by raising the caudal end of the table sharply, to bring the opaque substance up in contact with the vesical outlet.

For the study of the posterior urethral outlines it is necessary that

films be exposed during the injection of the fluid, otherwise, this portion of the canal empties itself so quickly into the bladder as to prevent informative studies. No such precaution is necessary where the anterior urethra alone is of interest.

Since much of the information obtainable by urethrography is better and more easily discovered by other procedures that often are of far greater diagnostic value, this method has not been used as widely as it perhaps deserves. Some urologists, however, have become greatly impressed with its value almost as a routine study. That it has a very definite value in some cases is shown by the very excellent radiograms in figure 102 for which



Fig. 103.—Roentgenogram of the seminal tract. The injection was made into each *vas deferens*, and the fluid has dilated the proximal structures on both sides and escaped via the urethra into the bladder. On one side it has passed into the epididymal tube. (Courtesy of Dr. Harry C. Rolnick.)

I am indebted to Dr. M. L. Brodney. It is probable that a complete diagnosis of the conditions shown could have been made in no other way.

**Vesiculography.**—While much work has been done by Ritter and McCarthy and others in the x-ray studies of the seminal vesicles following the injection of radiopaque fluids through the ejaculatory duct and by Belfield and Rolnick following their injection via the *vas deferens*, it cannot be said that the demonstrated value of these studies is of a nature that warrants their use as a routine method of diagnosis. In fact, it is doubtful if they have been the means of demonstrating enough pathology that could not have been revealed more simply and less dangerously by other means, to warrant resort to them on any but the rarest of occasions.

As studies of anatomy and, in a much smaller degree physiology, they have added to our knowledge. But as diagnostic methods of great importance they seem to have been signally lacking in value. As a means of producing epididymitis in those who otherwise, would not have it, they have real potentialities. (Figs 103 and 104.)

The writer has had the opportunity of studying a great many vesiculographic films and has been struck by the fact that in most of those pathet-

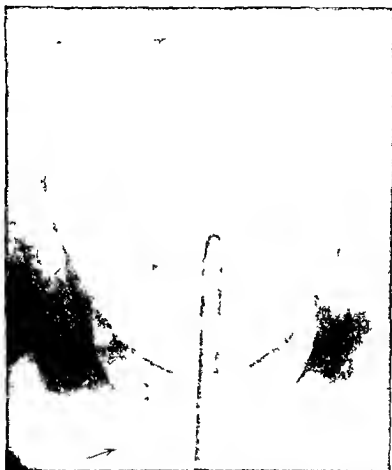


Fig 104—Roentgenogram of the seminal vesicle ampulla and vas deferens. The fluid has been injected through the ejaculatory duct and after filling the vesicle has passed along the vas deferens at least as far as the arrow on the lower left of the picture. (Courtesy of Dr. O. S. Lowsley.)

ically few cases wherein real pathology was demonstrated the diagnosis had been made or should have been before the procedure was carried out. He has grave doubts about any urologist no matter what his enthusiasm may be for its performance in others ever agreeing to have one done upon himself.

#### RENAL FUNCTION TESTS

**The Phenolsulfonphthalein Test**—The phthalein test introduced by Geraghty and Rowntree in 1910-1911 has proved to be one of the most

valuable of the simpler tests of renal functional capacity. Unlike many of the other dyes, it is practically all eliminated by the kidneys, and, in the urine, it lends itself to accurate colorimetric tests. In health, it appears rapidly in the urine, which rapidity varies somewhat with its mode of administration, being from two to six minutes after intravenous injection and from five to ten minutes when injected intramuscularly. Not only does it appear rapidly, but it is excreted with rapidity, from 60 to 85 per cent of the amount injected finding its way into the urine within the first two hours after its appearance. In the presence of bilateral renal disease not only is the appearance time prolonged but the amount excreted in a given time is lower than normal.

While the test may be relied upon as greatly as almost any other urine test, it is by no means infallible either as a total function test or as a differential kidney test. Indeed a pathologic kidney, upon rare occasions, may have a shorter appearance time than its hypertrophied fellow. The writer upon several occasions has seen a kidney containing large calculi excrete the dye before the well kidney, and, upon one occasion he saw the same thing happen in a kidney the upper half of which was badly damaged by tuberculosis. These occurrences are rare, but the fact that they do happen urges caution in placing too much credence in the value of appearance time. A far more reliable index is the quantity excreted, for it is rare, if indeed it ever happens, for a normal kidney to fail to excrete a safe quantity of dye in the given test time.

As originally developed, the test was done solely by the intramuscular injection of 1 c.c. of a 0.6 per cent solution of phenolsulfonphthalein and, in general medical circles, this method largely is adhered to. In urologic practice the general trend is toward the intravenous injection of the dye solution owing to its marked shortening of both the appearance time and the test period—factors of great importance where ureteral catheterization must be employed.

By the intramuscular method two modes of collection of the urine may be employed. If it is known that the patient entirely empties his bladder, ten minutes are allowed for the appearance time and the patient is instructed to void at the end of one hour and again at the end of the second hour. Such a method is of great convenience in ambulatory patients, as the patient may return to his home and bring the two quantities of urine to the physician later. The average output in the first hour after intramuscular injection is from 40 to 60 per cent and, in the second hour, from 20 to 25 per cent, making an average total of from 60 to 85 per cent for two hours. Figures below this tend to cast a suspicion upon the kidneys in direct proportion to the reduction of dye output.

If there is reason to believe the patient does not empty his bladder, a catheter should be passed for the test. Under such circumstances, intravenous injection is greatly to be preferred. With this method the catheter can be left in for a half hour after the dye has appeared. It is best to divide this time into fifteen-minute periods for quantitative estimation. Following intravenous injection, as has been said, the average appearance time is from two to six minutes. The excretion usually reaches its highest concentration during the first ten minutes thereafter in the normal kidney. Each kidney excretes from 15 to 30 per cent during the first fifteen minutes.

Unless the urine is very highly alkaline the dye is not obvious. For this reason the urine should be allowed to drop into some sodium hydroxide solution. In the presence of any large amount of pus and mucus strong sodium hydroxide causes the formation of a gelatinous mass which greatly interferes with dilution for quantity estimation. Hence where pus in quantity is present the urine should not be subjected to the action of this chemical until it has been diluted greatly with water. In the presence of marked pyuria a strong solution of sodium bicarbonate can be substituted for sodium hydroxide.

Moorhead has advised using sodium bicarbonate for alkalinization instead of the more dangerous sodium hydroxide solutions. In clinical work where these solutions must be handled by a number of persons this is a wise precaution particularly in view of the fact that a number of unfortunate accidents have occurred from the use of strong sodium hydroxide solutions.

The method of determining the quantity of dye in the urine is to dilute the amount of urine up to 1000 c.c. with water and check its color by comparison with the standard solution in a colorimeter. If the quantity of dye is small the readings are made better in a dilution up to either 250 c.c. or 500 c.c. in which event the result should be divided by four for the former and two for the latter.

As the differential phthalein test is a cystoscopic procedure it will be considered in that section of the book.

**The Indigo Carmine Test**—Many efforts have been made to displace the phthalein test by the indigo carmine test but while much quicker it has not instilled the amount of confidence that the phthalein test enjoys. It has some valuable features which make it very useful but it does not lend itself so well to accurate quantitative determination as does phthalein. The most telling argument of its proponents has to do with its speed as compared with the other and one does not have to listen long before the fear is aroused that the greater trouble of the phthalein test has something to do with the matter.

In the hands of a skilled cystoscopist who demands for kidney condemnation more than the erratic excretion of dye it has definite value but it certainly cannot be otherwise compared with the phthalein test.

Indigo carmine is not excreted so exclusively by the kidney as is phthalein nor is it eliminated so rapidly from the system its total removal requiring often as long as two days.

The test as now employed is usually carried out by the injection of from 5 to 10 c.c. of a 0.6 per cent solution into the vein and noting its appearance time from the ureteral orifice. An estimate then is made as to the comparative intensities of the dye from each side—a procedure which for even a fair degree of accuracy requires excellent color memory.

The dye is bleached in highly alkaline urines for which reason it is well to know the urine reaction of a patient in the event of nonappearance or faintness of dye excretion. Injected in the above quantity the normal kidney shows an appearance time of about four to ten minutes and the dye usually is so dilute by the end of a half hour as to be almost invisible while the urine is being ejected from the ureter. The dye may be injected simultaneously with phthalein as it is colorless in strong alkalies and does not interfere with the quantitative estimation of the latter.

Considered solely as a suggestion for further study in the presence of retarded excretion from one kidney as compared with the other, it has great value, but as a determining factor leading to renal surgery, it carries a large margin of risk.

Where it is not possible to locate ureteral orifices cystoscopically, the injection of indigo carmine often is of the greatest value in revealing them, as is outlined in the section on cystoscopy.

### BLOOD CHEMISTRY

Not only is the urologist interested in what the kidney has done but, in a larger sense, he is interested in what the kidney has been unable to do. For it has of late years become increasingly apparent that a safe working knowledge of the patient's excretory processes is not always to be obtained by our older methods of clinical study. It has been shown that, often, we were trying to form conclusions that were none too reliably based. *Our position was much as though one tried to determine the true composition of an original water supply by a quantitative analysis of the water after it had passed through a filter bed.*

The development of the various renal function tests did much to broaden our conception of renal values but they proved to tell only a part of the story. And it was because of the obvious shortcomings of all of these efforts that attention was directed toward such studies of the blood as would demonstrate what the kidney had been unable to accomplish. Here, were found no such marked variations as normally occur in the quantitative analysis of the urine. One had not to deal with things that greatly change from hour to hour as the result of diet, nervousness, body temperature, water consumption and the like. There was no need to collect 24-hour samples and, even then, be in doubt regarding the uniformity of the findings as often is the case with urine studies.

Within attractively narrow limits those substances in which we are most interested are present normally and constantly in their various proportions in health. They undergo no such wide variations in quantity in short periods of time as do like substances in the urine, and the things that cause their narrow variations largely are recognized and easy to control for test purposes. In disease their quantitative increases usually are gradual ones with no great width of daily fluctuation. Consequently, the establishment of average standards and the determination of them and their variations are matters of more attractive scientific accuracy. Starting with rather fixed standards of the normal it becomes a simple matter to approach the question of renal function from the side of accomplished work as well as from the side of what has not or cannot be excreted. Not that one approach may be disregarded and the other considered alone, but that both go to make up the clinical picture—one, perhaps, as a check upon the other.

As a result of these close studies it has been determined that, when renal functional capacity becomes embarrassed, there develops a difficulty in the excretion of nitrogenous products from the blood stream and their consequent increase in quantity in that medium. As renal impairment advances to the point of marked malfunction, that far more easily excreted substance, creatinine, begins to be retained in the blood stream. Hence, the procedures in which the urologist has become most acutely interested are

those for the determination of retained nitrogenous substances and creatinine

For biochemical reasons it has become the custom to remove the protein from the blood and carry out studies for the determination of the non-protein nitrogen (abbreviated NPN). The nonprotein nitrogen of the blood in the presence of normal renal function is approximately 50 per cent urea nitrogen. In the presence of renal disease this proportion varies somewhat in the higher figures, as will be seen later. So constant are these proportions, however, that, having the result in NPN figures, one may with sufficient accuracy quickly determine those for urea nitrogen. This relation of proportions is of considerable importance to the clinician in view of the personal preferences of those who indulge in the doing of such studies. For one worker considers the NPN determination more convenient, while another may lean so partially toward urea nitrogen determinations that his results are given in those terms.

**Nonprotein Nitrogen**—Normally, the nonprotein nitrogen content of human blood ranges from 25 mgm per 100 c c to 45 mgm in the presence of a high protein intake. In the presence of marked renal dysfunction these NPN values gradually rise to greater figures, reaching in rare cases as high as 350 mgm per 100 c c. The clinical importance of the higher figures depends in a large measure upon the possibility of removal of the primary cause of the renal dysfunction. Urologically, it is largely upon the removal of these causes that attention is centered. For, in this domain, such nitrogenous retention generally is due to urinary obstruction or to anuria resulting from urinary tract causes. The urologist must, of course, be aware of the so-called medical diseases of the kidney and their influences upon the retention of excrementitious substances in the blood but, in the main, he has little to do with these. They fall usually within the domain of the internist.

In the presence of a marked, or even a minor, increase of blood NPN the call is to remove those obstructive things that so commonly precipitate such blood changes. And yet, one must not plunge blindly into the surgical aspects of such cases until efforts have been made to bring about the elimination of these blood excesses. Weeks, perhaps months, of the most careful treatment often must be resorted to before such patients become *even moderately good surgical risks*.

On the other hand, there occur conditions wherein one has not the choice of delay. Particularly is this true in the presence of toxic changes in the better kidney as the result of infective lesions in its fellow. Under such circumstances life may depend upon the removal of the badly diseased kidney in order to remove the toxic overload from the better one so that it may exercise the remarkable recuperative power enjoyed by renal tissue.

Thus it will be seen that the prognostic value of the blood NPN is not in any sense fixed, but that it must be considered urologically in terms of many other factors. Certainly it is not nearly so stable as creatinine increases, for these rarely reach alarming figures until renal function almost has reached its end point.

**Urea Nitrogen**—The normal range of blood urea nitrogen (BUN) is variously placed by different workers, varying from 8 to 15 mgm per 100 c c of blood (Folin) to from 15 to 40 mgm per 100 c c (McLean). The



higher figures coming within the range of possible normal are prone to occur in individuals on a prolonged high protein diet with little fluid intake or in the presence of diarrhea.

The clinical importance of blood retention of urea nitrogen is similar to that of N.P.N. retention of which, as has been stated, it comprises half or more. The ratio between these two is so uniform that the N.P.N. content may be converted rather accurately into B.U.N. Quoting Keyes, this may be done by the following formula: "At or below N.P.N. concentration of 40 mgm. the Urea N. concentration may be found by subtracting 18. With each increase of 7 mgm. in the N.P.N., add one to the empirical number 22. Thus, if the N.P.N. concentration is 40, Urea N. concentration is  $40 - 18 = 22$ ; if N.P.N. is 61, Urea N. is  $61 - 25 = 36$ ." Or, a less accurate way, particularly in the higher reaches, is to consider the B.U.N. as approximately 52 per cent of the N.P.N.

**Creatinine.**—According to Myers, who was one of the first to attract attention to the immense importance of creatinine retention in urologic practice, this substance is normal in the blood in quantities ranging from 1 to 2 mgm. per 100 c.c. of blood.

Of the three substances in the blood that are of the greatest importance to the urologist, creatinine retention seemingly offers the highest prognostic value. For, as has been stated, this substance rarely is retained in quantity so long as the kidney retains any great degree of excretory flexibility. And it is rare for patients to survive whose blood creatinine has reached a concentration of 5 mgm. per 100 c.c. In fact, Myers places the point of dismal prognosis at 3.5 mgm. per 100 c.c. of blood.

While much work has been done on blood uric acid, amino acids, cholesterol and other substances, they have assumed no such importance in urologic fields as have the N.P.N., B.U.N. and creatinine and they are seldom called for in clinical studies of urologic cases.

#### UROLOGICALLY IMPORTANT CHEMICAL CONSTITUENTS OF THE BLOOD (After Stitt in mgm. per 100 c.c. of blood)

|                                 | N.P.N.  | B.U.N. | Creatinine. |
|---------------------------------|---------|--------|-------------|
| Normal                          | 25-35   | 12-15  | 1-3         |
| Acute nephritis . . .           | .....   | 40-200 | 2-10        |
| Early interstitial nephritis    | 30-50   | 15-37  | 2-4         |
| Interstitial nephritis—terminal | 100-300 | 60-300 | 5-28        |
| Polycystic kidney . . .         | . .     | to 75  | to 8.5      |
| Prostatic obstruction           | . .     | to 30  | 1.5-4       |

#### URETHROSCOPY

The visualization of the urethra in one way or another is an extremely valuable means of diagnosis. Unless one is perfectly familiar with the normal appearance of this canal through the particular type of instrument he is using for the purpose, he is likely to make many mistakes in diagnosis.

Particularly is this true if he selects the open end urethroscope of the types more commonly known in this country under the names of Young and Otis. With this type of instrument opinions of the urethra vary greatly with the skill and imagination of the examiner. As diagnostic instruments they are far inferior to those employing water dilatation of the canal but,

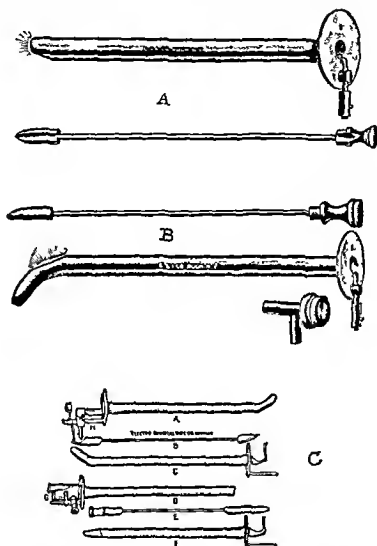


Fig 10. —A, Hoch's urethroscope. This is similar in type to both the Otis and Swinburne instruments. B, Swinburne's posterior urethroscope. C, Young's urethroscope. This instrument has an outside lamp and gives a larger working caliber for instrumentation or topical medication.

for the treatment of urethral lesions, perhaps otherwise discovered, they are invaluable.

The views obtained by the Young and Otis instruments depend largely upon how the instrument is held. With the greatest ease, by tilting the urethral end of it in various directions one can reproduce in a healthy canal many of the lesions that writers describe at such great length. To master

pressure when it has reached the proper direction. If there is no true obstruction, a moment's pressure will cause the instrument to advance through the sphincter surrounding this portion of the urethra. If the instrument does not make this advance it is because there is a stricture at the bulbomembranous junction, because its tip is caught behind an abnormally prominent cross band on the urethral floor, is in a false passage or is not aimed in the proper direction. Under either circumstance no force should be used to make it pass. It should be withdrawn about a quarter of an inch and made to follow closely the roof of the canal, where there are no depressions or cross bands. Failing in this, it is best to withdraw the instrument and use a smaller one or test the canal with a curved urethral sound, the tip of which passes only through the membranous urethra to avoid instrumental changes in the posterior urethra.

Having entered the posterior urethra, one's further technic depends solely on whether he wishes to advance the instrument into the bladder. This latter, he, of course, does not wish to do if he is using an open end instrument, as it is useless proximal to the vesical outlet in the male. If it is desired to work in the posterior urethra, much trouble is saved if the patient entirely empties his bladder immediately before the passage of the instrument, otherwise the vesical outlet opens from time to time and ejects a quantity of urine into the instrument, which fluid must be removed with a suction bulb and cotton-wrapped applicator.

For posterior urethral study the instrument should be advanced about three quarters of an inch beyond the cut-off muscle before the obturator is withdrawn, as, with this type of instrument, one must draw it from within outward if he would avoid trauma and bleeding. Passed in this way, it will be found that the opening of the instrument is against the anterior surface of the posterior vesical lip, just distal to the sphincter. By depressing the outer end of the instrument sharply the vesical outlet may be drawn into view but the manipulation is very likely to cause some urine to flow through the outlet into the scope. When the instrument is slightly withdrawn from the vesical outlet this is not so likely to occur.

By an occasional drying of the field with a cotton-wrapped applicator to clear it of urine, mucus or the like, a very good general idea can be had of the entire canal by gradually withdrawing the instrument and gently rocking it in various directions to relieve pressure on different portions of the mucous membrane. One soon will learn that the appearance of the membrane thus seen depends largely upon where pressure is made and, in the anterior urethra, how much tension should be made on the penis as the scope is withdrawn.

In order to pass a straight instrument into the bladder, as one invariably wishes to do with those allowing for water dilatation, it is necessary to depress the outer end of the instrument so that its tip will ride over the median commissure of the prostate gland. The extent to which this must be done depends entirely upon how far the vesical outlet is above the floor of the posterior urethra. Here one must seek the direction of the canal and, again, his best guide is the roof of the urethra, as the median commissure at times slightly overhangs the urethral floor to an extent sufficient to prevent easy tilting of the tip of the instrument much as was described in regard to the bulbomembranous junction. This usually may be surmounted

# PLATE I

## URETHRAL DISEASES AS SHOWN BY URETHROSCOPE



1 Great enlargement of verumontanum. Utricle and ducts widely separated

2 Same case as No 1 after application of 20 per cent silver nitrate

3 A small verumontanum with utricle and ducts irregularly placed

4 Localized area of inflammatory infiltration in pendulous urethra



Chronic lithiasis of bulbous urethra. Duct filled with pus

Verumontanitis. Ejaculatory ducts strictured. Granulations at base of veru

Two small villous outgrowths on verumontanum

Marked congestion and swelling of verumontanum



Prostatic hypertrophy. Urethral lumen Y shaped as result of lateral and small median lobes

Prostatic hypertrophy moderate median small lateral lobes

Prostatic hypertrophy large median very slight lateral hypertrophy

Prostatic hypertrophy great lateral enlargement urethra flattened between



Structure of urethra pale rough mucosa marked infiltration of submucosa irregular lumen, inflamed gland ducts

Structure of urethra similar conditions with more constricted orifice

Structure of urethra similar conditions, still like on face

Papillary edema at prostatovesical margin. A similar condition is often seen in women

by withdrawing the instrument about a half inch and tilting its end up onto the "roof" of the canal before any inward pressure is made. If the instrument is properly aimed it will pass into the vesical orifice freely without giving the sensation of passing through a sphincter as was the case at the membranous urethra. One merely feels a more or less resistant mass of tissue on the under side of the scope as it rides over the median prostatic commissure.

With the simple tubular endoscope, as has been said, diagnosis in the posterior urethra except for conditions causing definite change in contour is highly unsatisfactory. The color of the mucous membrane depends so largely upon the amount of pressure made by the instrument and the degree of muscle contraction in the tissues that it is almost impossible to state safely whether it is normal, congested or inflamed. On the other hand it usually is a simple matter to discover, when present, such things as cysts, definite ulcerations, glandular protrusions from the sinus pocularis and to some extent, lateral lobe prostatic encroachment. In the latter condition however, one hardly would be likely to choose such an instrument for diagnosis, for to do so would be to court troublesome bleeding.

With the open endoscope in the anterior urethra one is compelled to look down into a receding funnel of tissue which varies in color with the instrument's pressure and the amount of tension resulting from stretching of the penis as the scope is withdrawn. One, therefore, constantly must discount the result of these things. He has little trouble, however, in seeing marked local pathology if it be present. Ulceration, granulation, the blanching of long-standing submucosal fibrosis, the escape of pus in quantity from any glandular offshoot and at times, the openings of inflamed glands can be visualized. It is not always a simple matter to be sure of the minor grades of submucosal infiltration and often, seemingly more obvious pathology easily seen through the cystourethroscope escapes the eye.

Few urologic instruments so poorly deserve the rather good reputation borne by the simple tubular endoscope and few have led to more harm to the urethra. Despite its common use in the later stages of gonorrhea the author is convinced, from much observation that it usually results in more harm than good. To use it for tinkering with the glands of Littre in late gonorrhea, glands that cannot be injected often enough to bother with the procedure and glands that practically always will get well as the urethra gets well, providing they are not prevented from draining by such meddle some pseudoscience, usually is to imagine one is doing something he cannot do and to harm the patient by trying.

If one really wants to do diagnostic work in the urethra his best plan is to take one of the aforementioned water dilating instruments and reserve his simple tube endoscope for local treatment such as topical applications or minor surgical procedures. Even here, the fulgurating wire in the other type of scope has supplanted much that hitherto was done through the open endoscope.

#### CYSTOMETRY

Since the publication of a paper by D. K. Rose in 1927 reporting his studies of intravesical pressure under various conditions by means of pressure readings on a mercury manometer, many important additions have

been made to the subject. Though much question was raised at first as to the accuracy of his findings and interpretations, very little has been done that casts doubt upon either. And it is generally agreed that cystometric readings may add much in the study of a large assortment of bladder dysfunctions.

Many other types of cystometers have been devised, some simpler and others far more complicated. Most have relied solely upon direct readings, though MacKenzie and Beck have added to theirs a recording drum whereon permanent records may be made. Perhaps the simplest and least expensive of these cystometers is the one devised by Muschat and Johnston. (Fig. 108.)

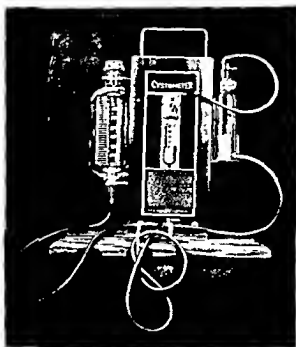


Fig. 108.—Simple type of cystometer devised by Muschat and Johnston.

To these instruments Simons and Bisher have added what they call a *sphincterometer* for the measuring of the contractile power of the vesical sphincters.

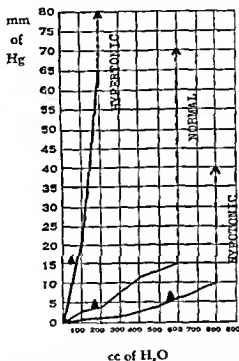
In the performance of cystometry a catheter, connected to a mercury manometer, is gently passed into the bladder and fluid at body temperature is allowed to flow through it while pressure readings are frequently being made. It matters not what type of cystometer is used, the principle differs little. Some instruments use a column of air between the mercury and the dilating fluid while others have the fluids directly in contact with the mercury.

It has been found that, upon the slow introduction of a nonirritating fluid into the normal bladder of a relaxed, cooperative patient, there comes a desire to empty the bladder after a comparatively small amount has been injected. Ordinarily this desire takes place when from 75 to 150 c.c. of

fluid have been introduced, and at a mercury pressure of from 0 to 20 mm. Following this there is a steady rise in intracystic pressure as the amount of injected fluid is increased until it reaches somewhere between 35 to 50 mm. There, then, is experienced the pain of true distention.

Between the points at which the first desire to void occurs and the pain of distention enters, there often is a feeling of fullness of the bladder. This, however, is so variable a quantity that most workers fail to record it in their readings. The amount of injected fluid that causes the pain of real distention varies greatly in different individuals, as would be expected from so widely a varying matter as normal bladder capacity. Also, it

CHART I



Composite cystometrogram representing the function of the bladder in the normal, hypertonic and hypotonic states. The three factors obtained are (a) (▲) The first desire to void (b) the pressure curve and (c) the maximal voluntary pressure (↑) (Courtesy of Dr. Maurice Muschat)

varies as often do the other factors with the degree of vesical tolerance, the relaxation of the patient and his cooperation during the test. Because a second study, in the absence of bladder inflammation usually is better tolerated by the patient, Rose and some of the other workers, repeat the test as a check on their original findings.

Normally, the onset of pain from distention occurs when from 300 to 500 cc. or more of fluid have been introduced. When such pain is well established it is common custom to have the patient strain to urinate so that a reading of his maximum voluntary pressure may be made. Muschat and Johnston place this at a minimum normal of 60 mm. and a maximum of 80 mm. of mercury. (See Chart I)

According to Watts and Uhle, "Menral irritability and lack of cooperation, debilitating and wasting diseases, pelvic pathology, even pregnancy, may deviate the curve from the composite normal. All things being favorable, however, it is found that by cystometry one rather easily may divide bladders into three distinct types:

- (a) Those giving pressure readings within the composite normal.
- (b) Those having a hypertonic action.
- (c) Those giving pressure readings that show a marked loss of muscle contractility."

Such a demonstration, taken with the possible cystoscopic findings, has been the means of obtaining a better understanding of the alterations in urinary function in general and of making more sure our diagnoses in that wide range of bladder dysfunctions due to neurogenic factors in the cord, peripheral nerves and even in the brain itself. For, in their masterly paper on "Bladder Dysfunction in Cases of Brain Tumor,"<sup>1</sup> Watts and Uhle have shown that such lesions can, and commonly do, cause cystometric readings that in every way resemble those that we commonly have attributed solely to cord or peripheral nerve causes. Their cystograms show both hypertonic and hypotonic readings that in every way accord with the others.

The readings of the mercury pressure by means of the cystometer have largely to do with the neuromuscular behavior of the detrusor muscles and the sensory reactions of the bladder. After much experimental work upon monkeys and humans, as well as many dissections upon humans, Van Duzen comes to the following previously quoted conclusions regarding the act of urination. "I believe that the act of urination is a synchronization of the muscles of the bladder. First we have an impulse by way of the hypogastric or sympathetic which results in contraction of the trigone. This lowers the posterior lip of the internal vesical orifice, converting the deep urethra into a tube forming a straight line with the base of the bladder rather than an acute angle. Secondly, the impulse, traveling by way of the sacral or parasympathetic nerves, causes a contraction wave in the detrusor muscle starting in the region of the internal vesical orifice as previously stated and produces intravesical pressure sufficient to empty the bladder."

Accepting this explanation as highly reasonable and well in accord with observed physiology, we see that interference with any part of this mechanism should alter greatly our cystometric readings. It still is obvious, however, that detrusor action is the pressure-giving factor and, that, given a normal detrusor action and good bladder sensibility, our higher readings should be found in those cases wherein trigonal function or other obstructive factors have caused the detrusors to hyperfunction in order to overcome a lack of ready patency of the vesical outlet or the urethra. Regarding the true action of the internal vesical sphincter, Simon's method of sphincterometry should give added data of value in some cases.

Just so soon as muscle action reduces, either as the result of the interference with parasympathetic nerve impulses, or the overdilatation of the bladder, with its resulting poorer muscle oxygenation as the result of failing sensory impulses, just so soon should the cystogram tend toward the lower readings. And it is only by a careful consideration of all of the factors

<sup>1</sup> Jour. Urol., May, 1937.



concerned that one should view cystometry as an exact branch of urologic science.

For a further consideration of these varied factors the reader is referred to the chapter on Neurogenic Bladder.

#### INSTRUMENTAL EXAMINATION OF THE URETHRA

Narrowings in any portion of the lower urinary tract are rather commonly symptom-producing lesions. At times they are the sole causes of an assortment of pathologic changes above the vesical outlet. Further, they may reflect their influences in the system at large, though, as a rule, these systemic changes are the result of secondary changes in the upper tract, particularly so far as they may embarrass renal function by back-pressure. Also, they may be the result of infection favored by poor drainage. In the presence of these systemic changes, which may occur at any age but are more common in the two extremes, it becomes a matter of the utmost importance that the urethral narrowing be removed.

In the young the most common causes of lower tract obstruction are congenital valves in the posterior urethra, congenital strictures in the anterior urethra, and a congenitally small external urinary or preputial meatus. The two latter may be seen by simple inspection but the others only can be discovered by urethral instrumentation or cystourethroscopy. Congenital stricture of the anterior urethra easily may be discovered by the use of the bulbar bougie or sound. Such simplicity in diagnosis does not hold, however, in the presence of congenital bands of the posterior urethra. In the presence of these abnormalities it usually is possible to pass an instrument into the bladder without eliciting anything to suggest the cause of obstruction. In fact, the obstruction may be present only when urine balloons the congenital binds or valves in such a way that they almost or entirely occlude the posterior urethral lumen. Consequently, they may be discovered only by cystourethroscopic study of that portion of the canal, a procedure which our smaller cystoscopes have made as practical and devoid of danger as are such procedures in the adult.

In youth and adult life the most common causes of lower tract urinary obstruction are those at the vesical outlet resulting from prostatic hypertrophy, fibrosis or cyst and those in the anterior urethra due to stricture or an abnormally small external urinary meatus. The latter is decidedly rare beyond boyhood because it is of such ease in diagnosis that, where it does create real trouble, it usually is corrected by meatotomy.

Urethral narrowings due to congenital malformation or inflammatory lesions are not so rare in early or, even, in late adult life. In their presence one cannot rely too strongly upon the history of a small urinary stream. The individual who never passed a full-sized stream of urine is prone to think that the one he does pass is of normal size and, strangely enough, a fair number of those who have postgonorrheal strictures have had such a gradual narrowing of the urethra that they are not aware of the reduction in the size of the urinary stream until it becomes very small.

While vesical outlet obstruction of one type or another may occur at any age, this form of urinary difficulty usually belongs to those beyond the age of fifty. Though we, in a measure, may assume that certain

lesions belong to certain ages, it is not well to follow the thought to too great lengths. It should be borne in mind that people with prostatic obstruction also may have urethral strictures, and, unless one is alert, he may overlook the one just because he discovers the other. This would seem to be a needless warning were it not for the fact that such blunders do happen with surprising frequency. It is so much the custom to think of certain urethral instruments as belonging to certain ages that mistakes are rather easily made.

Not so long ago, the writer was called to a hospital to see one of England's titled gentlemen who was suffering from urinary retention. Among other things, it was known that he had an enlarged prostate and, in conformity with general custom, an assortment of instruments with the so-called "prostatic curve" had been used with much trauma but no success. Vesical puncture was being considered when the writer arrived. It required but a moment to discover that none of the instruments really had reached the posterior urethra even. An olivary-tipped uretetal catheter was easily passed through a tight bulbomembranous stricture and urine immediately came through and along the side of it. It was strapped in, the bladder slowly and safely emptied itself and two days later it was a simple matter to start dilatation of the stricture. This was a fortunate circumstance, for the patient had too many other disabilities to be thrown safely into any type of operative procedure. Almost every urologist has had similar experiences.

One should guard against making a diagnosis of urinary tract obstruction from the fact that he sees his patient passing a narrowed urinary stream. Patients commonly fail to relax their urinary sphincters fully while being watched, and under such circumstances they cannot pass a large stream.

For the instrumental examination of urethral caliber one should have at hand instruments applicable to all types of obstruction regardless of the age of the patient. After the cleansing of both the urinary meatus and urethra, an olivary sound or bougie as large as the external meatus will allow should be passed gently to the cut-off muscle. It even is possible with this instrument to depress the manual end sufficiently to allow it to pass through the external sphincter to assure one's self that there is no obstruction at the bulbomembranous junction. Great care should be taken in doing this and, if one of the smaller sizes must be used, it should be avoided, as it is a simple matter to cause a false passage thereby.

In passing any instrument into the anterior urethra in search of a stricture the instrument should be held so lightly that it imparts to the examiner's finger any tissue density that may be present, and it never should be forced to go where it does not easily pass. Preliminary efforts with an instrument (sound or catheter) of larger than 20 F. are of value, for it not infrequently happens that such an instrument passes freely over a transverse urethral band that would catch the beak of a smaller one. Having found that the larger instrument meets with obstruction in the anterior urethra it is well then to resort to a small bulbar sound or bougie. One should be on his guard not to assume that normal cut-off muscle contraction is obstruction. As elsewhere has been noted, a diagnosis of stricture of large caliber is made rather commonly because of the spasm of this muscle in resentment

against the rapid passage of an instrument through it. One readily can avoid such an error by passing his instrument slowly. If there seems to be resistance, the instrument should be held stationary for a moment and then gently advanced. If the resistance is due to muscle spasm it promptly disappears, whereas that due to true stricture remains.

The hang of the shoulder of the bulbar sound when it is drawn from behind forward through a true stricture is so characteristic that there is little room for doubt. Even here, however, there is possibility for error, for unless the sound is held perpendicularly to the long axis of the body as it is withdrawn it may jump over the anterior extremity of the bulbar portion of the canal, which is rather a fixed area, in such a way as to give a definite sensation of urethral narrowing.

Proximal to the cut-off muscle it is in no sense an easy matter to make a safe diagnosis of obstructive lesions with instruments other than those offering visual possibilities. True, one may prove the presence of residual urine by the passage of a catheter, but even this does not of necessity demonstrate the presence of a true obstructive lesion. Patients with hydronephrosis, vesical diverticula, tabes or other cord lesions as well as those with no pathology may, and commonly do, have residual urine without true obstruction. Again, one may feel sure from the amount to which it is necessary to depress the manual end of an urethral instrument to make it enter the bladder, that he is dealing with a definitely elevated vesical opening. Even then, he has made only a partial diagnosis which assuredly needs visual confirmation. Elongation of the posterior urethra, though a fairly safe sign of prostatic hypertrophy or carcinoma, is not a final answer by any means. For diagnosis of such things by these means alone, however suggestive may be their findings, is far from placing one in a position to advise treatment intelligently.

Aside from the discovery of obstructions by the passage of instruments into the urethra one often may gain much information by the sensations of tissue density imparted to the instrument holding fingers. Instruments passed through a normal urethra give a definite sensation of softness and pliability of tissue in contradistinction to the sensations imparted by firm stricture bands, vesical outlet fibrosis and carcinoma or tuberculosis of the prostate gland. The last two rather commonly feel as though a hand was grasping the patient end of the instrument. So characteristic is this that one practically is safe in making a diagnosis of one or the other when this sensation is imparted by the structures posterior to the cut off muscle.

Beyond these things examination of the lumen of the lower urinary tract belongs in the domain of either the cystoscope or the endoscope, which are described elsewhere.

### DARK-FIELD EXAMINATIONS

Now that we know that there is no such thing as a typical chancroid and that almost any type of lesion may be the initial lesion of syphilis, we should realize that it is utterly unfair to the patient to be denied a dark-field study of even the most innocent-appearing penile sore. In fact, long experience gives one the feeling that he is more likely to find the *Treponema pallidum* in the more innocent looking lesions than he is in the

larger, more suspicious looking ones. It is the consensus that the curability of syphilis depends greatly upon how soon treatment is started, and early discovery is one of the most valuable things for the patient's welfare. Few things are more disconcerting for the physician than to have a patient, who was assured a sore amounted to nothing, return with the secondary eruption of syphilis.

The technic of dark-field study is such a simple matter that it does not merit being among the neglected things, and its findings may prevent the transference of syphilis to others. In order to obtain the specimen for study the suspicious area is cleansed with cotton, grasped between the patient's fingers or the gloved fingers of the physician and subjected to a few minutes of lateral pinching of the base. This causes the appearance of a drop of straw-colored or slightly blood-stained serum to appear. This is allowed to pass into a capillary pipette, is placed upon a slide and overlaid by a coverslip. If it is to be studied immediately under the one-sixth inch lens, it now is ready. If the oil immersion lens is to be used, or it cannot be studied at once, the edges of the coverslip should be sealed with yellow vaseline.

In dispensary and office practice it is easier to use the dry lens method, as it does not necessitate putting the light-stop in, as is required when using the oil immersion lens. The latter, of course, gives the higher magnification but it requires little practice to see the treponema under the lower magnification.

With either lens it is necessary to place a large drop of cedar oil on the top of the dark-field condenset so that there is no air space between it and the under surface of the slide. If the oil immersion lens is used there also must be oil between the coverslip and the microscope lens.

To avoid the possibility of mistaking other spirilliform organisms for the *Treponema pallidum* one should have in mind at least the four most valuable characteristics of the latter:

1. The organism should be an extremely delicate one.
2. The spirals should be regular and closely coiled.
3. The motility should be backward and forward, corkscrew fashion.
4. It should appear rather rigid in that it does not bend greatly, as the *Treponema pallidum* rarely angulates greatly on its long axis.

## CHAPTER IV

### UROGENITAL SYMPTOMS

It was a sad day for the lazy doctor when the curfew was tolled on the *so called cardinal genito-urinary symptom as a safe aid to diagnosis*. For those were comfortable old days when a pain in the back was good evidence, or almost proof, of trouble in the kidney, a painful stoppage of the urinary stream meant a vesical stone, ureteral colic, a ureteral stone, and other guides equally safe meant other things equally sure. Indeed, it was a great and comfortable old science until the cystoscope undermined its foundation and made the whole structure totter.

Nitze started the trouble when he devised a practical cystoscope. Then that keenest of observers, Harry Fenwick, drew the line that separated the old from the new. In all of medicine there are few classics greater than his book entitled *The Cardinal Symptoms of Genito Urinary Diseases*, and the physician who has not read it has missed one of the greatest of intellectual treats. Perhaps more than any other, he deserves the title of 'The Father of Modern Urology'. So thoroughly did he dethrone the symptom from its place of paramount importance and show the fallacy of much that was considered basic and settled in urology, that he deserves the thanks of those millions of patients who have been the beneficiaries of the new urology to which he so clearly pointed the way.

No longer do we preen ourselves upon our ability to tell what ails the patient from his symptoms alone. Physicians with the greatest amount of urologic experience have the least confidence in their ability to arrive at a safe conclusion in the absence of accurate studies the character of which is indicated, perhaps, by the symptoms. They know that the surest way to court error is to be swayed too greatly by the patient's symptoms. The safe determination of what ails him is a longer, harder road than it once was. Also, it is a straighter and better road.

Thus, the urologic symptom holds its value largely by virtue of two things: it brings the patient to the physician, and it often tells the latter what to do to discover the reason why the patient has the symptom. It is a part of the general picture, a far smaller part than it once was, and it may be a highly misleading thing. Because of these misleading qualities of symptoms, there has been developed the science of urologic diagnosis which, if properly understood and carried out, vies with anything in all the realm of medicine for the accuracy of its findings.

The symptom, however, is still an important thing to the patient, and an understanding of the value and possible misleading qualities of the various symptoms caused by urogenital conditions is a most important thing for his physician. He must know much about the latter, otherwise, as Bransford Lewis has said, "The symptoms assume more the character of will-o'-the-wisps, leading the practitioner and the patient on and on from one erroneous assumption to another, the while postponing the day of definite reckoning, exact diagnosis and correct treatment, until the unhappy

time when everyone realizes that it is too late; that opportunity has fled for the poor sufferer, leaving in its wake only the miserable duty of palliation until death relieves."

Hence, it behooves us to spend considerable time and effort upon a proper exhibition of symptoms and their values. Not only should we consider subjective symptoms but we should, perhaps, give an equal amount of attention to that far larger number of symptoms which the patient or his physician sees, for often they are more alarming to the patient than revealing to his physician.

When one essays to enumerate the objective symptoms of urogenital diseases he discovers that his list has greatly increased in numbers as the years have gone by. He sees that urologic diagnosis has made symptoms of what once were called diseases. He no longer can think he has completed his list by discussing such things as pain, burning, frequency and stoppage of urination, hematuria, pyuria, and the like. If he would court completeness he has to go on and on into that older realm of so-called disease, both urinary and sexual. For we have learned to view even the old charlatanic stock in trade of spermatorrhea, cystitis, urethrorrhea and a host of other like "diseases" as mainly the symptoms of other things. What a pity for the practitioner that all these high-sounding, immensely satisfying names should be relegated to so secondary a place as that of mere symptoms!

Though we have solved many of the old riddles and done much to put things in their proper relations to one another, one does not need far vision to see that there still are "diseases" which tomorrow we shall view as only the symptoms of other things. Even today, disease is beginning to look like the small dot in the center of the pistol target and symptoms the rings around it. And the dot is a gradually diminishing one. Obviously, one could fill volumes with a discussion on symptoms and still keep within his subject. But we have no volumes to fill and must not indulge in so great a multiplication as to miss the mark of simplicity.

#### THE PSYCHIC FACTORS OF UROGENITAL SYMPTOMS

It takes many years of close observation of urogenital patients to approach even a fair evaluation of the extent to which the mind influences these structures in health and disease, as well as the extent to which they influence the mind itself. And one can gain such an appreciation only by painstaking inquiry into the patient's state of mind and the most careful study of his urogenital tract.

It is by no means a simple matter to separate the real from the psychogenic and, before this can be done with even a fair degree of accuracy, there must be laid an extensive foundation. One must have a minute familiarity with the physiologic functions of these organs, their pathologic processes and the symptoms they produce. Without these it is impossible to weigh one against the other and to separate things due to pathology from those of a solely psychologic nature. One must know the normal influences of the mind upon urogenital function and the extent to which this function can be perverted by faulty conscious or subconscious cerebration.

It is not alone in sexual fields that one must consider the close association between the cerebrospinal and the urogenital systems. There are malfunctions and symptoms commonly attributed to lesions of the latter that are due solely to perversions of the former. And there are mental perversions that cannot be understood until they are viewed in the light of their urogenital causation. Nor can either be cured without attention to the cause whether it be in one or in the other.

The subject can be considered most advantageously under several different headings, namely:

- (A) The influence of the mind upon urinary function
- (B) The influence of the mind upon sexual function
- (C) Urogenital sensory symptoms of psychic origin
- (D) Psychic impressions of urogenital origin

Often there is such a close interrelationship of one with the other that they seem to merge beyond the point of clear delineation.

**The Influence of the Mind upon Urinary Function**—There are few body functions the proper coordination of which is more dependent upon an appropriate frame of mind than is the case with those of the urinary bladder. Whether it holds urine as long as it should with the degree of comfort that it should or is able to empty itself as it was intended to do rather often is a question of what its possessor is thinking about the matter. All physicians are familiar with the fact that many individuals are utterly unable to start the urinary stream in the presence of others. But there is not an equal amount of familiarity with the other functional disturbances of these organs that are truly psychogenic. Because of this lack of familiarity not a few functional perversions are attributed to pathologic processes that often are not present or if they are commonly have nothing to do with the change in function.

Briefly normal urination is dependent upon a stimulus being sent from the trigone of the bladder to the brain. There then is engendered an impulse of deliberation which causes the patient voluntarily to contract his trigono-urethral and detrusor muscles to open his vesical outlet. Then in some way rather poorly understood there is brought about relaxation of the cut-off muscle. This relieves the bladder of its urethral constrictors, whereupon the vesical wall further contracts and expels the urine. This latter may be aided by the weight of the abdominal viscera and contraction of the abdominal muscles.

To retain urine in the bladder with comfort there must be a freedom from both trigonal irritation and psychologic interference with this phase of bladder function. In the present connection we however are considering only the mental aspects of the problem wherein true trigonal irritation does not play a part. We must however realize that even in the absence of true trigonal irritation and certainly in the absence of trigonitis, psychic meddling with bladder function can step up the sensory mechanism of the trigone to a definite point of discomfort which rather promptly interprets itself as a desire to urinate.

Let us consider first the mental interferences with the proper emptying of the bladder. So dependent upon the will is this, and by so delicate a thread does it hang that it needs but a thought that it cannot be accomplished to throw it all awry. The commonest expression of this is seen in

the fact that almost 50 per cent of all men find it either difficult or impossible to urinate when others are present. And the sole reason for the difficulty is that the individual is thinking failure. If he thought solely of the fact that he wanted to empty his bladder he would have no difficulty in doing so.

Seldom do we carry this common observation further; we smile and say "try again." There is a goodly number of individuals who carry matters much further than this common disability; who build upon this slender foundation a structure of fears and mental fixations that influence the act of urination for years, perhaps for life. Some of them learn that they can contract their abdominal muscles and force the opening of these refractory sphincters, and a few of these continue the practice until late in life, showing a trabeculated, back-pressure bladder differing little, if at all, from that of prolonged prostatic obstruction.

As middle life approaches, most men find that the urinary sphincters do not respond to messages so promptly as they once did. Indeed, this tardiness of sphincteric relaxation after fifty years of age is so common that, by most of us, it is considered normal. It is particularly noticeable when one arises from a warm bed on a cold winter's night. And the more one notices, the longer he stands. If he has neurotic tendencies his imagination is likely to play him some rather sorry tricks, and just what happens functionally thereafter depends upon the type of mind he has and depth of the mental fixation he develops. If he has heard much of prostatic obstruction, he is sure that he has one, and just as soon as this idea becomes fixed there is real functional trouble ahead. Psychic retention of urine beyond middle life is by no means as rare as it is supposed. It also is probable that most of the acute retentions during the course of gonorrhea are more psychic than otherwise.

Of more general interest is the train of mental impressions that so commonly underlie frequency of urination. As a matter of fact, it speaks well for the mental stability of mankind that most of us grow to manhood with the ability to retain a good quantity in the bladder. For the days of youth are impressionable ones, bladder experiences often are peculiar ones, and there are many who develop fixations and phobias that interpret themselves into perversions of urinary function.

Often the story runs about like this—the individual finds himself in a social situation that does not allow of urination when the desire is upon him. The desire wears off but returns more urgently. Even this second summons may wear off, but the third one is usually so urgent and accompanied with so much pain from vesical overdistention that he makes his escape from the entanglements. And upon just what happens then, depend the ideas he stamps on memory's screen. He first vows never to let it happen again. Then, he either has some difficulty in starting the stream, or perhaps he does not. If he analyzes what happens, he notes that when the bladder is half empty the stream of urine grows smaller and much lazier. In fact, it often just dribbles out. He stands what seems to be an interminable length of time and ejects the last portion in small spurts by the expenditure of much muscular effort. The experience convinces him that such things should be avoided; often he is convinced that real damage has been done to his bladder.



In his anxiety about the matter he not uncommonly carries things to the other extreme, never allowing the bladder really to fill itself thereafter. Every time he feels that there is any amount of urine in the bladder he urinates. The more he urinates the more he wants to, and the less he stretches his bladder the more intolerant does his trigone become to even the slightest stretching. Thus, a vicious circle is started that may dog him throughout his life, causing him to arise one or more times at night and leaving him none too comfortable during the day.

Before the masculine portion of the race became so prostate minded as it is today, habit frequency in the male was largely confined to those who had gotten these youthful mental scars. Today, however, the habit is as likely to start in middle life or beyond, and it is almost as likely to bring about a habit pseudocontracture of the bladder.

Not only may mental fixations produce changes in bladder function but these changes in function not uncommonly produce definite bladder changes which are prone to mislead the cystoscopist who is not alert to such a causation. The small bladder free from pathology often is not so small as it seems. The patient has developed a lowered comfort carrying capacity and just so soon as this point of distention is reached by the cystoscopist there is an urgent desire to urinate. If this is due to the fact that true bladder capacity is small the desire becomes almost imperative if any more fluid is put into the bladder. If, however, the condition is one of pseudocontracture the desire to urinate passes off while the bladder is being subjected to greater dilatation and it usually is possible to double the amount of fluid before the desire to urinate returns.

The large bladder due to constant neglect of the desire to urinate readily may be confused with true vesical atony. The bladder wall is lazy in its contractions. In fact, it does not seem to contract at all but empties itself by virtue of the pressure of the other abdominal viscera. The fluid flows idly through the cystoscope and, if its distal extremity is raised sharply, the urine often ceases to flow.

The habit of constantly straining to empty the bladder, as has been said, can, and at times does, bring about such hypertrophy of the fascicular bands of muscle as almost to belie the fact that there is no true obstruction to urination. More often the trabeculation thus produced is of the fine type that makes one careful not to acquit the spinal cord without study.

Again, there are the urinary disturbances so frequently encountered in those individuals with true hysteria. These may take almost any form between the two extremes of complete incontinence and complete retention. The writer has known a patient to be catheterized for complete retention for six months before it was discovered to be due to hysteria. Psychotherapy cured the condition in a day. The absence of local causes in the presence of such dramatic malfunction should arouse suspicion of their true nature.

The extent to which mental processes may influence urinary function can be seen in the following cases.

Mr. R. C. for five years had had a diurnal frequency of urination which, at times, was as often as every fifteen minutes. During this time he had had a vast assortment of treatments and a dearth of studies. He harbored almost as many fears about his bladder as he had had different types of

treatments and diagnoses. His urine was clear and there was no evidence of infection or disease of his urogenital tract. With great difficulty he was convinced that he had no trouble. He had never been cystoscoped before and, when shown how clearly one could see through the instrument, he was ready to believe what he was told. The removal of his fears and efforts toward the control of his habit soon reduced his diurnal urinations to three or four.

Mr. H. B. was a decidedly temperamental musical artist who, during the previous two months, had had to arise at least twice during the night. The night before he gave a concert he usually had an involuntary seminal emission and a frequency of urination that, the night before he was seen, reached twelve times in two hours. Aside from being decidedly neurotic he had numerous fears about his bladder, being sure something was radically wrong with it. There was no microscopic or cystoscopic evidence of disease or abnormality. This knowledge, together with a dram of elixir of phenobarbital the night before his concert, quickly brought about a cessation of symptoms.

R. D., a physician of fifty years, for two years had had difficulty in starting his urinary stream, lack of propulsive force and dribbling after urination. He was sure that he had both prostatic hypertrophy and an urethral stricture and had read everything he could get on both conditions. When convinced that he had neither condition, that his dribbling was due to the fact that he was not contracting his bulbocavernous muscle to empty the bulbar urethra and that his difficulty in starting the stream was solely because he contracted muscles instead of relaxing them, he registered an immediate cure.

Dr. X., while doing some postgraduate work in Vienna and drinking much beer, noticed that he was urinating quite frequently. Being at what he thought was the "prostatic age," he became quite concerned about the matter and consulted a world-famous Viennese urologist, who impressively palpated the prostate and told him he had a hypertrophy that should be operated upon at once. The patient decided to bring his prostate home for some American urologist to toy with. During his homeward journey he was so busy urinating that there was little time for anything else.

His cabin mate, a friend of the writer's, urged him to stop in Philadelphia on his way home and see what someone thought who did no surgery. Examination revealed that he had a congested prostate free from infection and that there was not the slightest cystoscopic suggestion of vesical outlet obstruction, nor was there any residual urine.

His relief at this news, and the explanation of his symptoms, was so great that he registered an immediate cure. After perhaps fifteen years, he still has his prostate where God placed it and he sleeps in comfort for many hours without having to arise to urinate.

It would be a simple task to add to these few cases a great number of case histories speaking just as loudly of the influence of the psychic influences on normal urinary function.

**Influences of the Mind upon Sexual Function.**—Even to enumerate the various influences of the mind upon the sexual function would require a list tiresomely long. For, aside from the physiologic processes that make sexual functions possible, all seems to be psychic. Without the mental stimuli

of one sort or another to awaken this physiologic urge, mankind would make a decidedly poor showing and rather quickly would cease to be. For it is obvious that modern sex trends are not to any overwhelming degree the outlets for a great procreative urge, largely, the hope is that its pleasure may be reaped without gathering too many of the tares of parenthood. And to this end contraception is being developed almost into an art.

With a function so preponderately dependent upon mental processes, it is but natural that it should take almost as many different trends as there are individuals, for no two minds are alike. Starting from the basic pleasure-love inherent in all mankind it easily is buffeted by the slightest of mental changes. It may be stimulated almost to the point of uncontrol or inhibited to those of dysfunction or complete failure. It may be perverted into countless unnatural channels wherein it may become fixated or it may be wooed back into its normal spheres.

The extent to which aberrations of the sex instinct and its outlets influence the human mind, body and behavior is not even dimly sensed. And back of many a symptom complex lies a mind harrassed by some real or imaginary fear or fixation that must be searched for if cure is to attend. However, as these matters are rather fully discussed in those chapters having to do with sex and its oddities there is no need that the subject be further elaborated upon here.

**Urogenital Sensory Symptoms of Psychic Origin**—In the advance of modern urology there has developed a decidedly general tendency to search for weighty, superscientific explanations for perfectly simple little things. This habit, of course, is not confined to urology, but is seen in practically every specialty wherein surgery becomes the most attractive part. General surgery almost reeks with it. It has a decidedly tragic side in that it brings to operation many individuals who would be far better without operation. Often the operation serves only to deepen the mental fixation from which the symptoms originated. If one would take the trouble to delve into the mental workings of that host of patients whose sensory symptoms long outlived the operation that was aimed at removing them, he would find much to convince him that his surgery rather easily can be *overdone*.

Those patients who do not reach the drama of the operating room frequently are the victims of a great assortment of treatments that, of themselves, could not possibly relieve the symptoms toward which they are aimed. They spend years in a seemingly endless pilgrimage from doctor to doctor for the relief of sensory symptoms that, because no real local cause is found, are subjected to much in the hope that at least one thing out of the many will cure. And, when everything fails, the victim is labeled "neurotic" and interest in him ceases.

Obviously there is much reason for us to grow a bit more critical of our use of that term *neurotic*, particularly as it is applied to patients with urogenital sensory and, more particularly, sexual symptoms. Its true meaning of a nervous disorder due to no discoverable lesion is scientifically applicable. But, from common usage, it has gathered a meaning that implies that the individual willfully has symptoms for the sympathy they may bring him. After many years of close study of patients with such symptoms, the writer has been unable to find any appreciable number of them

with such an intentional background. He has encountered a number of otherwise normal individuals earnestly seeking relief from uncomfortable local sensations that, though psychogenic, are in no sense imaginary. Certainly, there were no evidences of an intent to be sick. These patients do not want sympathy; they want cure, and they are willing to undergo painful financial sacrifices in order to get it. Many of them have spent large sums of money and allowed themselves to be subjected to great pain in their search for relief. But, because of a too material mental attitude on the part of the physician, they have failed to get it.

The writer would have no difficulty whatever in producing from his files the accounts of hundreds of patients whose seemingly endless pilgrimages were terminated by a search of their minds equally as careful as had been the searches of their urogenital systems. Long ago he abandoned the word "neurotic" as it usually is applied because he found that it had no just application to these patients.

One need not be deeply versed in the finer points of psychology in order to reveal the mental fixations that underlie these cases presenting urogenital sensory symptoms. Searching for the fears that lie so near the surface as do these needs no great psychiatric training. It needs just plain common sense. The patient readily can be gotten to tell what he thinks of what ails him and it almost invariably is a simple matter to go back of this and discover the fears and convictions that underlie these thoughts. Despite the high-sounding names that our psychiatric brothers give their manifestations, human minds react pretty much alike. At least, most of them are susceptible to fears, and the fears are going to find some outlet. Some will rationalize the matter and obscure the evidences of the outlet, others will not gain such control and, if the fear has to do with their own bodies, they will add much to their own unhappiness and the support of the medical profession—just how much depends upon how soon someone senses the mental fixation and removes it.

We, as physicians to these patients, might do well to develop one fixation ourselves, viz.: *Psychogenic sensory symptoms are not imaginary things, they are just as real as is the discomfort of a surface paraesthesia or the pain of a true neuritis.* We might get in this frame of mind more quickly if we went back to our undergraduate days and recalled how real were the symptoms we had of this, that or the other dire disease after a particularly illuminating lecture upon it. Some of us might arrive there more quickly if we recalled how uncomfortable was that pain in the fossa navicularis when we thought we had contracted gonorrhea and how it immediately disappeared when we knew it was not that disease. For this is the commonest and most quickly relieved of all ideogenic discomforts that strike the urogenital tract. Most virile adult males have had it.

Admitting, then, as probably all of us will, that there are such things as ideogenic pains and discomforts, it is obvious that one should not make such a diagnosis until, by the most careful studies, he has ruled out other causation. This has a double value. Not only is it good science, but such a study has a most salutary effect upon the patient's mind in preparing him for the much needed psychotherapy to come.

Obviously, one who has given close attention to these things could fill many pages in portraying the vast assortment of symptoms experienced by

these sufferers, symptoms that range all the way from uncomfortable sensations to those of agonizing pain. Often, they carry with them functional departures from normal and, at times, these functional aberrations have persisted so long that there have developed pathologic changes. Under these latter circumstances it usually is decidedly difficult to work back to the true cause.

Instead of covering the possible pages of discussion to which the subject easily lends itself, brevity might be courted, and with equal profit, by the brief citation of a few cases.

Mrs. A. had been seized some months before with 'agonizing' pains in the bladder. These would come on five minutes after urination and last until the next urination, which would be followed by a few minutes of relief. She had a normal urine, normal bladder with normal carrying capacity and no discoverable pelvic pathology.

She had a close friend who had the same symptoms as the result of vesical carcinoma. When she became convinced that her urinary tract was perfectly normal, her bladder pain entirely disappeared.

Mr. X. was an unmarried mining engineer, who had spent many years in the mining regions of the Andes. He was physically rugged and no one had found anything wrong with his mind or body. During eleven years he had had attacks of discomfort in the glans penis and prepuce, which symptom was never present when he was mentally occupied. Sometimes it would be absent for months.

No local basis could be found to explain the symptom. Psychologically there was a world of explanation. There was the conviction that eleven years before he had contracted gonorrhea, though he had had no objective symptoms. Underlying this was his mental picture of gonorrhea as he saw it among the South American miners, a disease of terrific activity, long duration and bearing countless complications of gravity. He had had almost no end of local and general treatment for what definitely was solely a psychogenic sensory symptom. His cure was a simple matter.

Mr. S. had had gonorrhea twelve years before. The treatment had been decidedly traumatic and much had occurred to frighten him. He finished the experience with a feeling as though a finger were being pressed into the right side of his perineum and some discomfort in the urethra. His doctor then had resorted to topical applications of silver nitrate to the posterior urethra. Probably as a surprise to both, the patient was comfortable for the succeeding week. As a result of this, the patient had been given such endoscopic treatments every one or two weeks for twelve years.

At the end of this time the writer saw him, found no local cause, and told the patient that he would get well if he did nothing but overcome the anxiety state that obsessed him. Evidently the salesmanship was not good, for he went back to his original doctor for eighteen months more of endoscopic treatments.

He then returned and promised to refrain from any local treatments for three months and try to banish his fears. In about a month his determination seemed to be wavering. Then some directing influence took a hand in matters and saw that he got another attack of gonorrhea. The patient knew he should not be endoscoped while he had such an infection and got that form of treatment out of his mind. The symptoms disappeared and have never returned.

**Psychic Impressions of Urogenital Origin.**—Psychic impressions resulting from urogenital conditions may be so slight as to require little attention or they may be so great as to dominate almost the entire mental picture. They may range from a mild anxiety state to one of complete mental breakdown. And, to one who has had much to do with urogenital diseases, it is apparent that much of this mental damage easily could be prevented by attention to the faulty cerebration at its earliest inception. Were all those who treat such diseases sufficiently on the alert and deeply interested in the problem, most of it would cease to be.

Few of us realize what a large part of life's picture the sexual function occupies, particularly in the male. For it is essentially in the male that we find the various mental states resulting from urogenital misfortunes, and the greater number of these are to be attributed to the genital aspects of the question. Particularly is this true in the Hebrew race, with its religious background of accentuation of the home and procreation.

Such mental states, however, are not confined solely to any particular race of individuals. They do seem to be largely one of the costs of civilization, for they occur with extreme rarity in the uneducated. The more unstable the nervous mechanism the more commonly do they arise, as would be expected. Most of them, for that reason, occur in youth and early adolescence, but they are not altogether rare in later life. Many of them, upon superficial study, would seem not to be apprehensions engendered by the sexual bearing, but a closer investigation usually will reveal that the underlying factors are purely sexual in nature.

Aside from sex, the urogenital apparatus rarely occupies a place of such importance that it would cause any more anxiety to its possessor than would any other organ or group of organs merely serving as conducting structures. It would make no greater mental changes than do intestinal or respiratory abnormalities.

The human mind, however, is an abiding place of complexes, a battlefield of conflicts wherein the censorship between the conscious and the subconscious is none too strict. Each mind is a realm to itself. Individuals may follow somewhat similar trends, but few of them are highly capable of self-analysis. So true is this that one well might define psychology as the art of analyzing everyone's mental processes but one's own. Wherefore, it becomes the duty of the physician not only to discover the causes of these urogenital complexes and convincingly apprise the patient of them, but, even in a greater measure, to be sufficiently frank with him to prevent the development of the complexes and the conflicts they so often engender.

While the most common urogenital fixations in early life have to do with matters of sex, those of the male of more advanced age more commonly turn to the prostate gland. Of late, the prostate gland among males has become a conversational matter that far too often turns the mind to an acute analysis of urinary function. And just so soon as this happens, the years beyond fifty furnish symptoms that are prone to make suspicion conviction. For most men of these years, as has been said elsewhere, find that it is necessary to spend a longer time in starting the urinary stream than was the case in the days of youth. The lessened distensibility of the aging bladder causes them to arise at night to urinate. If, perchance, they drink any quantity of fluids before retiring they increase the number of

times Suspicion having been aroused, there often develops the fear of injuring the bladder by overdistending it and, then, begins a diurnal frequency due solely to a more ready bladder-consciousness which has no true local causation

The fear of persisting gonorrhea is perhaps, the most common cause of urogenital psychoneurosis other than impotence. Such patients become profoundly analytic of themselves, they search for urethral discharge, study the voided urine and develop psychogenic sensory symptoms in some portion of the tract to further fix the great fear. One conversant with past and, to a large degree, present beliefs regarding so called "chronic gonorrhea," readily can understand why the patient feels this way about the matter. His doctor frequently keeps his mind stirred up, and what his doctor does not do he does himself by self-analysis and the reading of things, even in medical textbooks, that are by no means in conformity with the real truth. Assuredly, it is about time that the medical profession awakened to the fact that true chronic gonorrhea (the gonococcus present) is a rare disease and that back of almost every true case is either a drinking, sex indulging patient or a decidedly meddling physician.

There is no more reason why we should call gonorrheal treatment sequelae "chronic gonorrhea," than that we should call a postpneumonic cough "chronic pneumonia." When the gonococcus no longer is present the case ceases to be one of gonorrhea and we should cease to call it so. To continue longer to so designate the common minor conditions following this infection is to perpetuate a medical fallacy that has added enormously to the building up of psychoneurotic states in countless individuals.

In these days of lay pseudo education upon medical matters there occur even greater opportunities for the development of mental fixations than has been the case in the past. And it would be surprising, indeed if there were not more individuals who became the victims of sensory and functional disturbances. Almost anyone can produce such annoying symptoms if he lets his mind dwell too much upon any particular organ or set of organs. He can get a fine case of indigestion, constipation, cardiac palpitation or almost anything else in that way. He can step his supposed sex needs up almost to the point of satyriasis or blunt them to the disappearing point. He can develop a urinary frequency that would put to shame the famous "Diabetic Pup," or he can bring on a complete retention that gives him no chance in such a race. He can put paraesthesias or pains wherever his mind says they should be. Or, by sensory memory, he can keep pains and discomforts that started as the result of local pathology, long after their original cause has been eradicated. In fact, he can do almost anything between the projection of symptoms from the brain outward and the development of mental fixations from the fleeting symptom inward. And the physician who loses sight of these facts will register far fewer cures than will he who keeps them always in mind.

#### PAIN

*Pain often is a blessing in disguise, for it is one of the greatest of life-saving provisions. Its "blessing" features, however, are of brief duration, for, when it has driven its possessor to seek help, and has served as a diagnostic indicator, it then becomes one of man's greatest afflictions. To the*

physician, pain is either the cry of harrassed nerves or it is the moan of psychic fixation. As the former, it gets his immediate attention; as the latter, it commonly tends to arouse his antagonism. Some day, when we realize more fully how real to the patient is ideogenic pain, this trend toward antagonism will disappear and we shall take much more interest in the influences of psychic processes in the production of pain.

We have not advanced sufficiently far from the old days when we made much of the supposed disease, hysteria, and largely viewed it as malingering, generally to take the broader view of the matter. We cannot brush it aside as willful suffering on the part of a mentally disordered patient, as the bid of the neurotically inclined for sympathy, nor as a sensation without an objective background. It has been pointed out in the preceding chapter that, as we more carefully analyze the workings of the human mind we become more fully aware of the immense influence of certain types of what we might call subconscious fixations in the production of pain that is as real to the patient as is the pain of obvious nerve injury. We see that these fixations are not truly sensations without an object. True, the object may not be of a material sort such as an injury of a nerve trunk and, yet, it even might originally have been that.

Mental fixations that cause pain usually have fear as a basis, and, far too often, the fear has grown out of what some doctor has said or done to the patient. As previously has been said, many of our so-called urogenital neurotics acquired their fixations in the doctor's office. Again, memory may be entirely at fault in the sense that the pain lingers long after its material causation has been removed. Thus, we see that ideogenic pain often is real pain, just as real as is the pain of a true neuritis. Again, definite nerve pain due to some local nerve pathology may linger as a subconscious brain fixation long after the pathology has disappeared. For the subconscious mind is as susceptible to "scars" in some individuals as is the conscious.

Unfortunately for the physician, pain is a thing he cannot see, a thing for which, unless it is of great severity, he must take the patient's word. And the patient's word regarding pain often is a most misleading matter, for it at times exceeds sensible bounds sufficiently to monopolize almost the entire clinical picture. Consequently, the examiner is safest if he takes the stand of not really taking into consideration the question of ideogenic pain until the most exhaustive studies have failed to show a reasonably material explanation for it.

A description of true pain in urogenital lesions is in no sense an easy matter, for patients and pains vary so greatly from one another as to make fixed rules an impossibility. Particularly is this true in lesions of the kidney, for other abdominal lesions may, and frequently do give pain that differs in no way from those pains we so commonly consider almost pathognomonic of trouble in or around the kidney.

Making allowances for the fact that pain in a certain region does not of necessity mean that there is pathology in the urogenital organs in that region, as well as the fact that pathology in one renal fossa may give all of its pain in the opposite side, let us see what near-rules we can lay down for our clinical aid.

In the first place, the urogenital system, so far as pain is concerned, lends



itself to a very useful division. It will simplify matters greatly if we consider it under the following divisions

- (A) That portion above the ureteropelvic junction
- (B) That portion between the ureteropelvic junction and the ureteral meatus
- (C) The bladder
- (D) The posterior urethra prostate and seminal vesicles
- (E) The anterior urethra
- (F) The scrotal contents

**Pain Above Ureteropelvic Junction**—Regarding that portion above the ureteropelvic junction we can make some rather safe statements. When it is the cause of pain the pain usually is felt mainly in the costovertebral space and in the upper anterior abdominal quadrant and the patient in showing where the pain is usually places his thumb on the upper lumbar region and his fingers of the same hand anteriorly. Further the pain is

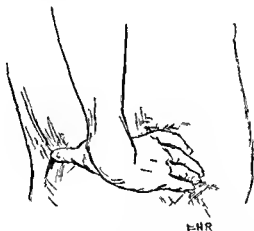


Fig. 109—Usual position of the hand of a patient showing the location of renal pain

more likely to be of a dull aching character rarely lancinating unless there is an associated diaphragmatic inflammation.

We safely may say that both the kidney structure and the mucous membrane of the true kidney pelvis are practically devoid of pain sense. The entire kidney may undergo destruction or the pelvis may become filled with a large branched stone without giving the faintest evidence of its presence so far as pain is concerned. Let there be marked distention of either however and the story is different. Or let there be inflammation of the renal capsule the perinephric region or the outer layer of the kidney pelvis and pain appears. Wherefore we are mainly correct in saying that so called renal and pelvic pain more often are perirenal and peripelvic in origin and that they usually are confined to the side of disease but that there is such a phenomenon as a reno renal reflex wherein the pain is referred to the well side.

Not every seeming reno renal reflex however is real. When one kidney is undergoing gradual destruction its fellow usually is undergoing a compensatory hypertrophy. The rapid enlargement of such a kidney

often causes great capsular stretching and offers a ready explanation for many of our cases of supposed reno-renal reflex. Because of this, one always must be on his guard lest he advise, in those patients in whom cystoscopic study is not possible, an exploratory operation in search of the cause of pain. Not a few surgical reputations have been marred by the removal of kidneys undergoing this compensatory hypertrophy.

**Pain Having Origin Between Ureteropelvic Junction and Ureteral Meatus.**—This depends in character largely upon the matter of spasm of the musculature. In the presence of spasm it is sharp and lancinating with a wide possible range of transference. When, for one reason or another, spasm has ceased and great dilation with pressure occurs, the pain becomes aching in character, not widely transferred and usually of diminishing severity. Associated with the spasm there may be marked pelvic

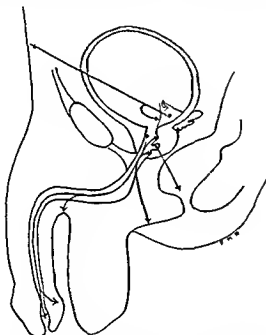


Fig. 110.—The usual points of pain or discomfort transference from various pathologic lesions of the trigone and posterior urethra.

distention, for which reason there frequently is an added "renal" pain. On the other hand, gradual ureteral distention may occur without any pain whatever.

The pain due to the passage of a stone from the renal pelvis to the bladder gives us our most typical so-called ureteral colic. From the moment the stone gets into the grasp of the ureteropelvic musculature the pain begins. It generally is excruciating, and of a spasmodic character, with more of a sense of soreness than of true pain between spasms. The pain starts in the renal region, passes along the ureteral line into the bladder, penis (vulva in the female) and perhaps into the testicle or down the inner side of the thigh. As the obstructing body descends the point of origin of pain often seems to descend with it, though the transference of it below remains the same. Should it lodge at the pelvic brim in right-sided ob-

struction it has a marked similarity, at times, to the pain of appendicitis. Not a few perfectly healthy appendices have been removed because of this fact. When the obstruction reaches the intramural portion of the ureter the colicky pains seldom are severe, nor is the pain transference so great. There is more likely to be pain in the testicle or vulva on the same side as the sex may be. And, as it reaches the ureteral orifice, the colic ceases and the only pain is that of ureteral or pelvic distention.

The severity of the pain is no index of the size of the offending obstruction as the smallest stones sometimes give the most severe of pains. The patient's temperament is a factor of great influence. Upon rare occasions foreign bodies of considerable size may be passed along the ureter and cause no pain. The passage of blood clots and portions of necrotic tissue may be equally as painful as the passage of stones.

**Bladder Pain**—Pain caused by disease or distention of the bladder varies more in character than in any other portion of the urogenital tract. As a rule, it is felt in the suprapubic region and deep in the pelvis. The pain of great, acute distention usually is felt at the apex of the viscus wherever the apex may be at the limit of distention. Bladder pain varies from the slight discomfort of trigonal congestion to the intense, agonizing pain of acute distention. It may be continuous or intermittent, aching, burning or lancinating. Upon rare occasions marked vesical distention causes pain along the penis which is slightly relieved by traction upon that organ. Thus, one occasionally sees the patient in acute urinary retention pulling at the penis in his agony.

The mucous membrane of the general bladder wall is highly insensitive to pain. If, however, an inflammatory lesion of it penetrates into its muscular coat, as in panmural cystitis (Hunner's ulcer), the pain may be, and usually is, excruciating.

In contradistinction to the general bladder wall, the trigone is an extremely sensitive region, and it is from this portion of the bladder that most vesical pain or discomfort takes its origin. The general impression that vesical pain often is referred along the urethra is hardly borne out by clinical experience. One may draw an imaginary line cutting horizontally through the vesical outlet and feel assured that practically all painful lesions above it, except the passage of rhings through the ureter, will be felt above it and those below the line will not. One rarely, if ever, sees a stone in the bladder refer its pain along the urethra unless it is small enough to be caught in the grasp of the sphincter at the vesical outlet. In other words, unless it touches the posterior urethral mucous membrane. As a rule, trigonal pain is felt deep in the pelvis and in the suprapubic region.

Vesical pain may be present on the desire to urinate, during urination, after the act or it may have no definite relation to urination. The latter, however, is not the rule, as most bladder pains are rather closely associated with bladder function.

**Posterior Urethral Pain**—Pain as the result of posterior urethral disease usually is referred to the fossa navicularis or to the penoscrotal angle and is either of a burning, or of a lancinating character. At times it is referred to the perineum or rectum. Most of those cases in which the sensation is referred to the rectum, however, are in patients presenting some pathology of the sinus pularis.

**Pain in the Anterior Urethra.**—Pain in the anterior urethra usually is felt in the fossa navicularis or at the meatus. Occasionally the pain is felt in the glans penis only. Upon rare occasions, and more particularly in the presence of stricture, pain is felt in the inner side of the thigh or knee, at times in the heel or toes.

Prostatic pain depends largely upon the type of lesion causing it but is usually felt in the rectum. At times it is vesical but it is this solely because of secondary trigonal changes. The pains in the back attributed to prostatic infection are due, largely, to toxic absorption and do not differ from those of any other focal infection. The pains of prostatic carcinoma are not truly prostatic pains but are the result of carcinomatous impingement on pelvic nerves and of metastasis.

Testicular pain may be referred along the cord but usually it is confined to the testicle itself. Involvement of the vas deferens commonly accounts for the pain being referred along the spermatic cord. In not a few cases, pain of a dull, aching character in the testis is due to incipient hernia and is relieved promptly by a truss or some dressing giving support over the internal inguinal ring.

The pain of acute vasitis, as in descending gonorrheal infection, is felt first in the corresponding lower abdominal quadrant, or at the inguinal ring; later, along the spermatic cord and in the testicle of the same side. When occurring on the right side it is very likely to arouse a strong suspicion of appendicitis. The tenderness when the finger is pushed into the inguinal canal, the associated gonococcal urethritis and the great swelling of the vas and epididymis within twenty-four hours of the onset of pain make the differential diagnosis. Upon rare occasions the pain of acute vasitis passes up the ureteral line to the renal region and mimics acute ureteral block. Here, again, the diagnosis is made the same as above, together with the fact that the renal and ureteral pains almost invariably cease within twelve hours of their onset and epididymal swelling, pain and tenderness take place quickly. It is probable that, in these cases, there is an acute transient ureteral block occasioned by the swelling of the vas where it passes over the lower end of the ureter, and that this explains the renal and ureteral pain.

Seminal vesicular pain may be rectal or it may pass along the spermatic cords. Usually there is no pain in seminal vesicular inflammation.

Ideogenic pains may mimic almost any or all of the pains resulting from true local pathology. They most frequently project themselves into the bladder, urethra, perineum or testicles.

### FREQUENCY OF URINATION

Frequency of micturition is probably the most common of all urogenital symptoms. Almost every human being presents it at some time. It may be a symptom of the utmost importance; it may be a matter of no more seriousness than a normal physiologic reaction, or it may even hang on a mental impression. Almost anything and almost nothing may cause it.

A recital of all the possible causes of frequency of urination almost would serve as an index to a volume on urology. It is a symptom that, from an etiologic standpoint, almost defies classification. One of course might describe it under the several headings, physiologic, psychogenic,

neurogenic and as due to real urogenital pathology, but before he finished he would find one overlapping the other to such an extent as to result in confusion. Particularly would this be the case when he turned to the female, for her frequency of urination almost is a heritage of her sex—particularly around the menstrual period.

One might consider frequency from the standpoints of supply, capacity for holding and things limiting this carrying capacity. For, stripped to its utmost simplicity, this is usually what he is dealing with. The human bladder is a reservoir for the holding of urine, which varies in size in different individuals. Its ability to carry its full amount of urine depends upon a proper neuromuscular balance. If it must empty itself frequently, it does so either because more urine is being poured into it than is usual or its neuromuscular balance is disturbed for one reason or another. Consequently, the three primary questions to be answered in any genuine case of frequency of micturition are

- (A) Is the bladder receiving more than its usual amount of urine?
- (B) Is it unable to carry its usual amount?
- (C) Is it unable completely to empty itself and causing a frequency because of almost an overflow of retention?

One must add, "genuine" frequency, for a fair number of patients who pass urine at normal average intervals get the idea they are doing so more frequently than is normal.

Two of our questions are usually rather simple ones to answer. How much urine does the patient pass at one time and how much in the twenty-four hours? Of course this does not always tell us how much the bladder was able to hold before frequency set in, but one who passes 8 ounces or more at a time and still has a frequency of urination is not likely to be suffering much from a limitation of carrying capacity. Unquestionably, far more than the normal amount of urine is being excreted by the kidneys. Conversely, the individual who passes in the twenty-four hours a normal amount of urine or less and has a true frequency of urination most likely has some perversion of the neuromuscular balance of the bladder itself.

Were it not for the fact that the character of the urine passing into the bladder often is the sole cause of the upsetting of its neuromuscular balance, one well might divide causes, so far as the bladder is concerned, into extrinsic and intrinsic, though, even here, there is no sharply marked borderline. However, one can group some of the underlying factors under certain headings.

Under the heading of psychic factors, as has been said, belong a surprisingly large number of those patients visiting the physician's office with this symptom. They do not all belong to that group of individuals who, by virtue of their introspective tendencies, we like to call "neurotic." Many of them belong in the other camp—men or women of affairs who, because of a transient physiologic frequency during some period of excessive nervous or mental stress, get the impression that something is wrong and keep up their frequency by psychologically meddling with bladder function. Comparatively few bad habits are more easily developed than frequency. As previously has been said, it needs but the suspicion that all is not well with the bladder to develop a true habit bladder. Physicians,

who should be on their guard, are not even immune, though they usually are more easily cured.

When we consider true neurogenic frequency as detached from its psychic aspects and inflammation, we are in a field that is not very clear-cut. We must leave out the influence of trigonal nerve ends and think in terms of spinal cord and nerve trunks. When we do this we find a rather limited application to frequency of urination, except in the utter loss of bladder sensation, wherein there occurs a loss of true emptying power associated with a frequency that is an autonomic matter born of vesical overdistention. It has been shown experimentally that stimulation of certain nerve fibers causes forcible contraction of the detrusor muscle of the bladder. Frequency as the result of spinal irritation does occur but the urologist rarely sees it. At least, he rarely makes a diagnosis of such causation, despite the fact that medication with belladonna usually relieves it at once.

In the earlier stages of cord lesions eventuating in paralysis of the vesical sphincters, there commonly is a period of urinary frequency just prior to the days of complete incontinence. One rarely should be misled by this, however, as the history is that of true loss of bladder control and immediately points to the spinal cord.

The reputed frequency caused by the petechial spinal cord hemorrhages of the various blood dyscrasias, notably pernicious anemia, are as often more apparent than real. There usually is an associated hemorrhagic cystitis, with blood in the urine, to account for the vesical symptoms.

One might consider among the extrinsic causes of frequency of micturition, though their effects are really intrinsic, that small group of cases due to tug upon the bladder base from some extravescical induration, adhesion, or growth. It will be recalled that the normal urge to empty the bladder comes because the viscus has dilated sufficiently to stretch the trigone. And this same stretch may be occasioned by any extravescical lesion that pulls the bladder base. Because of the greater frequency of pelvic inflammatory lesions and growths in the female, this type of frequency largely is confined to that sex. It occasionally occurs in the male by virtue of the attachment to or inclusion of the bladder in a descending hernia. Under this extrinsic heading also should be included the frequency of urination occasioned by the limitation of bladder distention by some pelvic mass. In the early months of pregnancy this symptom is the rule, and it is not an uncommon one in the presence of uterine fibroids of any size. Frequency of urination also is, at times, an overflow symptom of rectal irritation or inflammation.

Perhaps, those physiologic or pharmacologic causes of frequency so familiar to us all should be classed as extrinsic also. The former usually exert their influences by a marked increase in the quantity of urine and have been considered under the heading "Polyuria" (page 174). The latter may occasion their frequency by causing a polyuria or by giving a distinctly irritating quality to the urine so that the trigonal nerve ends are caused to send frequent messages that step up the desire to urinate. Among these latter should be mentioned those articles of diet that so commonly cause the appearance of large numbers of calcium oxalate crystals in the urine. It is rare to find a case of ovaluria unaccompanied by frequency

and burning, and one usually finds a dietary history of grapefruit, rhubarb, spinach, large amounts of tomatoes, apples or carbohydrates.

It would be satisfying, indeed, if one could draw the line here and say that none of the foregoing causes of frequency is associated with the cellular evidences in the urine so characteristic of most intrinsic inflammatory lesions. However, pyuria of one grade or another is of such frequent occurrence, and the existence of two or more things so common, that such a statement would fog the question greatly. The farthest that one should go in this regard is to state that, if no concomitant intrinsic urogenital infection or inflammation exists, these causes are not associated with pyuria.

As one turns to the intrinsic causes of frequency of micturition he finds such a vast assortment as to beggar description or enumeration. There are those, like congestions of the trigone, obscure pseudomembranous trigonitis and panmural cystitis (Hunner's ulcer), which need not be, and frequently are not, associated with any urinary change. The same may be said of prostatic obstruction where infection does not exist.

On the other side of the picture lies that vast assortment of pathologic conditions in almost any part of the tract which, through irritation or inflammation of the trigonal surface, produce the varying grades of intolerance to any quantity of urine. They may be acute or long continued and it is in the solution of their causes that there occurs an immediate widening of the diagnostic field. With them, as with any type of frequency, the step that should follow immediately after history-taking is urinalysis, for in the urine often lurks the key that leads to the answer. And it is in the direction of the cause and its eradication that cure lies. It, however, should be remembered that a bladder that for some time has been intolerant because of disease is very likely to leave the patient with a psychogenic frequency, and one does well to give attention to this fact as his case approaches cure of the more obvious cause of the frequency of urination.

In many individuals there occurs a definite limitation of bladder capacity as age advances. The gradual lessening of carrying capacity of the aging bladder in these patients often is overlooked. As a cause of frequency it is by no means rare, though it generally is attributed to other things. As previously has been said, in these days of the dissemination of pseudo-knowledge regarding prostatic enlargement among those beyond middle life, there often enters a definite psychic factor that greatly magnifies bladder sensibility and steps up urinary frequency where no real pathology exists. It is not wise, however, to come to such a diagnosis without a cystoscopic study.

#### INCONTINENCE OF URINE

True urinary incontinence means that the bladder is totally unable to retain any urine whatever and that it constantly escapes through the urethra. It has become common custom, however, to include under this heading the so-called incontinence or overflow of retention wherein the urine constantly escapes because the bladder is too full to hold more and, yet, cannot expel what is present.

True incontinence usually is of two varieties. Either the urinary sphincters are paralyzed or the bladder is so highly intolerant that it refuses

to retain any urine. The former may be due to any spinal-cord or local condition that interferes with the conveyance of nerve impulses to and from the bladder. It is particularly common in the later advanced stages of tabes and is not uncommon after operations in which much nerve destruction has taken place. It also has followed electric excisions at the vesical outlet. In the presence of complete epispadias it always is present.

As the result of bladder intolerance it may be a symptom of such things as advanced vesical tuberculosis, panmural cystitis, vesical inflammation from infection, severe chemical irritation and, occasionally, from trigonal tug due to the inclusion of the bladder wall in a hernia. Upon rare occasions it may be due to irritation of spinal centers. It has followed the oral administration of such things as cancharis and turpentine.

In the female, true incontinence may follow birth or operative injury as the direct result of trauma to the bladder sphincters. Usually, this is a transient affair but, upon rare occasions, it may be permanent.

The incontinence of retention usually is due to an obstruction at the vesical outlet or in the anterior urethra. It is common after spinal injuries. At times it occurs in the spasmodic stages of early tabes and in pernicious anemia. It also may be due to urethral stricture.

The diagnosis between the two varieties depends upon proof that the bladder is distended or contains no urine whatever. And the treatment is solely that of the causal condition. In the incontinence following birth or operative injury to the sphincters a number of surgeons have succeeded in overcoming the condition by means of muscle-substituting operations.

#### POLYURIA

The diagnosis of polyuria must rest upon actual demonstration of the fact that the patient passes much more than the average of from 1500 to 2000 c.c. of urine in twenty-four hours. Without measurement of the amount of urine passed, the physician easily may be misled. Where there is the slightest suspicion of malingering, some one other than the patient should do the measuring. It is a simple matter for an unwatched malingerer to add water to the urine he does pass. A patient with a small or mildly intolerant bladder often passes urine so frequently that he is sure to think he is passing highly abnormal quantities of it. Even in the presence of proved increase in the amount of urine one must rule out such factors as great fluid intake, changes in external temperature, stimulating ingested substances such as tea, coffee, and gin, temporary nervous and mental stress, and the like.

True polyuria may be a symptom of a large assortment of local or distant causes. It may be caused by cardiac, hepatic or systemic conditions. It may be due to some type of nephritis, or a reflex symptom occasioned by prostatic hypertrophy or other urinary obstructions. It may be due solely to nervous causes, as in irritations of the cerebral cortex, exophthalmic goiter or epilepsy. Again, it may be due to diabetes mellitus, diabetes insipidus, and a host of other things belonging mostly in the domain of the internist.

\* Polyuria is almost the rule in the early stages of renal tuberculosis, and



it is extremely common in advanced calculous disease of the kidneys. Quoting Thomas Walker, "Frequent contraction of the bladder is said to increase the quantity of urine secreted and in all forms of disease where there is increased frequency of micturition there is, as a rule, an increased quantity of urine."

By far the greater number of cases of polyuria encountered in urologic office practice, are due to psychoneural causes. For mental anxiety and nervousness very commonly are associated with increases in urinary output far out of proportion to the amount of fluid ingested. Such a polyuria may be but a fleeting symptom or it may be present for days.

### ANURIA

Strictly speaking, the word anuria means that no urine is formed, but usage has given greater flexibility to it and it has become current custom to make it mean that no urine is passed into the bladder. Such an interpretation of the word at once widens the field enormously in that it takes in a number of perversions of function that do not belong under a strict definition of the word. To be in line with modern usage, therefore one must not be too particular about what his dictionary says. Wherefore, in the present discussion the word anuria means that the patient does not succeed in getting any urine into his bladder, though his kidney, under some conditions, may be secreting it.

There have appeared throughout the years a number of classifications of the causes of this often most alarming symptom. In recent years, at least, the urologists have settled first upon a division of these causes into the two large groups, the secretory and the obstructive. The latter they have left as it stands, though they also have given it the synonym, post-renal anuria. The secretory variety they have divided into prerenal and renal. By prerenal is meant those circulatory and nervous system causes that prevent renal excretion, such as low blood pressure, interference with renal blood supply, hysteria and any nervous influences that can inhibit renal secretion.

Under the heading of renal causes are included the kidney inflammations, particularly acute and chronic glomerulonephritis, the influences of poisons, such as bichloride of mercury and others expending their action on the kidneys, the reflex cessation of function of one kidney because of removal of its fellow and things of like character.

By obstructive anuria is meant those cases wherein, though urine may be secreted by the kidney, because of some obstruction to the ureters, either intrinsic or extrinsic, the urine is prevented from reaching the bladder. This may be due to one or more of a number of causes and, under certain of them, may really be a combination of both obstructive and renal anuria. The most common cause is bilateral obstruction of the ureters by calculi, new growth, the block of one ureter with reflex or prerenal anuria on the other side, block of the ureter where only one kidney is present, where the opposite kidney has ceased to function because of definite pathology, after the unfortunate surgical removal of the only functioning kidney, or after bilateral ligation of both ureters during complete hysterectomy.

No matter what the cause of anuria, it is one of the most serious of urinary symptoms, for, if not relieved, it leads surely to the death of the patient. It can be due to so many things that it is by no means a simple matter to learn the actual cause in many cases and a number of diagnostic procedures may be necessary before this is determined.

One, of course, must precede all diagnostic measures with proof that there is no urine in the bladder and that he is not dealing with complete vesical retention. Where such a cause can be discovered and removed promptly, the prognosis is good. Such, however, is not the case with prerenal anuria wherein causes are not so readily removed as is usually the case with obstructive anuria. Fortunately for the urologist, these cases usually fall within the domain of the internist, as do most of those of the truly renal group.

Of particular interest to the urologist are the cases of obstructive anuria, and the aim in treatment is to overcome the obstruction before uremia is obvious or before there is any great change in the blood chemistry. The prognosis bears a direct relation to the promptness of retentive relief and too much time should not be wasted in the hope that this will be brought about spontaneously.

One perhaps should start with a "flat" roentgenogram in the hope of locating the obstruction. Whether this is negative or positive for stone, immediate steps should be taken to pass catheters into both ureters. It is not sufficient to pass a catheter into the side of known obstruction when there is a reflex anuria on the other side. If these pass they should be allowed to remain in the ureters, as it has been shown that the mere presence of the catheters often starts renal functioning. So true is this that it even is worth trying in renal and, perhaps, prerenal anuria.

If the catheters reveal an obstruction, and one is not able to get even the smaller sizes to pass beyond it, there should be no hesitancy in advising immediate surgical relief of the obstruction, as the patient's chance of survival depends upon the promptness of relief. One should not be misled by the fact that the patient does not seem very ill, for it is characteristic of many anuric patients that their only symptom for some days is that they pass no urine. Others start early with such uremic symptoms as nausea, vomiting, headache, hiccough, stupor, and, perhaps, diarrhea.

Having relieved obstruction one should push fluids, particularly glucose solutions, by one means or another and, where possible, should allow the patient to regain good renal function before subjecting him to the dangers of major surgery.

Due regard should be paid, however, to the fact that there may be a complete anuria of several days' duration associated with true hysteria, and every effort should be made to rule out this state before surgery is resorted to.

Hinman<sup>1</sup> has outlined the treatments applicable to anuria as follows:

<sup>1</sup>"The Principles and Practice of Urology," W. B. Saunders Company, Philadelphia, 1935, p. 270.

- 1 Attempts at diuresis with
  - (a) Forced fluids
    - by mouth
    - hypodermoclysis
    - intravenous injection
    - rectum
    - duodenal tube
    - using water salt solution glucose sodium bicarbonate or Fischer's hypertonic solution etc., according to indications
  - (b) Diuretics and antispasmodics hypodermically
 

|             |               |            |
|-------------|---------------|------------|
| Pilocarpine | } (dangerous) | Belladonna |
| Diuretin    |               | Atropine   |
| Euphyllin   |               | Morphine   |
  - (c) Hot packs and diathermy to the renal area gentle massage dry cupping etc
- 2 Extrarenal excretion
  - Free catharsis
  - Sweats
  - Venesection
- 3 Ureteral catheterization
  - (a) For diagnosis
  - (b) For drainage in which case the catheter or catheters are retained
  - (c) For pelvic lavage with warm salt or alkaline solutions and mild pelvic distention in an attempt to relieve vascular spasms
- 4 Paravertebral block for splanchnic anesthesia (Neuwirt) (Successful in 7 of 8 cases in which it was used by Rubrinus) Ten cc of 0.5 per cent novocain is injected into the paravertebral spaces of the twelfth dorsal first and second lumbar vertebrae
- 5 Renal decapsulation and denervation

### DYSURIA

'Dysuria is one of those comprehensive terms that mean one thing to one physician and another thing to another. Etymologically the prefix *dys* means difficult, painful, bad and a number of other like things, so that when applied to the act of urination it may mean almost anything except normal urination. In urologic circles the term gradually has been divorced from the thought of pain and has grown to mean difficult urination. True difficult urination may be and commonly is associated with pain, but it is common custom to consider them under two different headings. In fact we have separated from dysuria such things as frequency, retention, overflow of retention and the like, and considered it as signifying solely that the individual can voluntarily urinate but does not do so in the normal fashion.

Dysuria may be due to obstructions at the vesical outlet or along the urethra, to injury or change in the spinal cord, brain or nerves, or it may be due to psychic causes alone. The most usual local causes of dysuria are prostatic hypertrophy, prostatic carcinoma, median bar and urethral stricture. More rarely it is due to stone, vesical tumor, cyst at the vesical outlet, acute inflammation at the vesical outlet, and prostatic abscess. Occasionally dysuria has its cause in some of the organs contiguous to the bladder, or in the pressure of pelvic tumor, particularly in the female.

Of the neurogenic causes the most frequent is *tubes dorsalis*, though other spinal cord lesions and injuries account for a fair percentage. The false dysuria of psychologic meddling with the act of urination preventing relaxation of the cut-off muscle has been discussed in several places.

Dysuria may come on suddenly or gradually and be of almost every conceivable grade. In lesions of the vesical outlet or vesical stone, the patient may be compelled to assume various positions in order to pass even a small amount of urine.

Before the days of cystoscopy it was the custom to lay great stress upon the character of the stream, the position assumed by the patient, the mode of onset and like things, as they were reputed to have great diagnostic value. We now know that such things frequently are as highly misleading as are most of our "pathognomonic" symptoms.

The painless stoppage of the stream so commonly seen in the irritative stage of early tabes is perhaps one of the most highly suggestive of the various types of dysuria. The patient can maintain sphincteric relaxation as long as he mentally concentrates on the matter but, just as soon as he ceases his concentration, his cut-off muscle quickly contracts. He may go through this procedure several times before he entirely empties his bladder. Often he leaves some urine in it.

The less ready sphincteric relaxation of individuals past middle life, previously cited, is so common as almost to merit a position among the normal physiologic changes in men. As has been pointed out in several places, not only does the loss of elasticity in the ageing bladder cause individuals with no true pathology to arise at night, but this tardiness of sphincteric relaxation causes many of them to stand for quite a time before the urinary stream is started.

Obviously, the treatment of dysuria is the treatment of its cause, whether it be in the mind, the spinal cord or the urogenital tract. The treatments of these varied causes are elsewhere considered and need no repetition here.

#### VESICAL TENESMUS

By vesical tenesmus ("strangury" of the older writers) is meant painful contraction of the bladder wall during, but more particularly at the end of urination. It may be occasioned by any vesical inflammation but is more common in the presence of acute trigonitis, panmural cystitis, tuberculosis, vesical calculus, foreign body and in the late, infective stages of carcinoma of the bladder. It has been said that true tenesmus can result from extravescical causes of a neurogenic nature, but such cases must be of great rarity, if, indeed, they ever do occur.

Tenesmus, except in the presence of panmural cystitis, pseudomembranous trigonitis and, perhaps, trigonal leukoplakia, rarely occurs in individuals without a marked pyuria. Generally, it is a part of a violent cystitis and, as often as not, the acuteness of the cystitis offers a contraindication to cystoscopic studies aimed at revealing the cause. It usually is necessary to allay the tenesmus before going on with one's diagnostic studies.

In severe cases of tenesmus the bladder musculature is in tonic and extremely painful spasm and refuses to allow the viscus to hold more than a few drops of urine. Even this is forcibly expelled every few moments to the great suffering of the individual. Frequently, a few drops of blood follow each urinary expulsion.

Tenesmus also may be due to extravescical tug, usually as the result of the attachment of the bladder to a hernia or some pelvic inflammatory condition.

Though the treatment of tenesmus is the treatment of the cause, it often is necessary to resort to palliative measures pending the time when the required diagnostic procedures may be safe. At times much relief can be obtained by the careful injection of a small quantity of 3.0 per cent liquid guaiacol in olive oil into the bladder or by resort to hot sitz baths. Upon many occasions it is necessary to resort to belladonna and opium rectal suppositories. In the milder cases the oral administration of hyoscyamus, belladonna and codeine give great relief.

### PYURIA

Except for the transient pyuria that sometimes follows chemical applications to the urinary mucous membranes, the presence of either microscopic or macroscopic pus in the urine is an infallible evidence of infection. The location of such infection may be revealed only after the use of a number of diagnostic procedures or it may be obvious and need no further study.

It should be borne in mind that the presence of a few leukocytes in the urine is perfectly normal. It has become the custom however to consider anything above an average of five leukocytes per high power field in the centrifugated sediment of a 15 c.c. tube of urine to be pathologic and denoting infection in some portion of the tract.

When one considers that any portion of the urinary tract from the kidney tubules to the external urinary meatus as well as the various mucous channels in association with the urethra, may be the source of the pus cells, he realizes the impossibility of hard and fast rules regarding the etiologic factors at play.

While pus in the urine may be a sign of the utmost importance to the health and perhaps, the life, of the individual it may also be merely the transient evidence of a fleeting infection. As has been stated under urinalysis, one must rule out both phosphates and urates before macroscopically assuming that a cloudy urine is so because of the presence of pus. Even then a microscopic study of the urine is just as necessary.

Aside from the use of the two or three glass tests as localizing procedures, one can draw almost no conclusions as to the source of the pus by any particular appearance it may give to the urine. He can say only that it came from some region distal to the vesical outlet or that it did not by the glass test. Hazarding further opinion without more study is to court the uncertainty of guesswork.

While it is ordinarily a simple matter to determine the source of pus coming from the urinary tract distal to the vesical outlet, particularly if the pus is in any great quantity, it is not always so simple a matter to learn the reason for pus originating in the bladder or above. It is here that the art of cystoscopy scores one of its greatest victories. For, by means of the cystoscope and ureteral catheter one rarely has any great amount of difficulty in tracing pus to its source. Even then however the question of cause usually remains to be answered and in its answer may rest much laboratory, renal function and roentgenographic study. With these combined diagnostic measures it is rare indeed that the skilled cystoscopist can not arrive at a real diagnosis.

The continued presence of pus in the urine from above the vesical outlet (in the absence of tuberculosis or abscess openings from contiguous organs) almost invariably means poor drainage. Accordingly, much of the diagnostic work has to do with the cause or causes of poor drainage. Thus, one has to search for obstructions in the urethra, at the vesical outlet, along the ureter or in the kidney pelvis. And, as a vast assortment of pathologic entities partially may obstruct the conducting structures or favor poor drainage in other ways, one has as his field of study the entire tract.

Rarely does one have any trouble in diagnosis of the cause of pus coming from below the ureteral orifices. In fact, at least 90 per cent of the cases of pyuria referred to the urologist for study are of this type, and better than 80 per cent of them have their pus coming from the distal to the vesical outlet. In other words, by the use of the microscopic and, often, macroscopic study of the two glasses of voided urine, at least 80 per cent of the cases of pyuria are shown to be lower tract infections.

To enumerate all the possible causes of pyuria would be to jot down every type of infection from every cause that could take place in this complicated system of tubules and reservoirs. Such a list would include lesions of the most trivial sort and those that intervene in importance between these and lesions of the most serious type.

One should not dismiss the subject, however, without some discussion of the bacterial content of the urinary pus, for in it rests some possibility for confusion. As previously has been said, the tendency to think one has answered the bacteriologic aspects of pyuria when he has found one bacterium in numbers has been a great misfortune to many patients. The diagnosis of colon bacillus pyelitis based upon the finding of pus and many colon bacilli is, perhaps, the most usual error of this sort. In acute obstructive lesions of the ureter or kidney pelvis in children and pregnant women associated with a rise in temperature, this diagnosis often is correct. Though in chronic pus-forming lesions of the urinary conducting structures the colon bacillus may play an unimportant part, not infrequently the underlying lesion is a renal tuberculosis, as a search for tubercle bacilli will reveal.

The staphylococcus in numbers in bladder and upper tract urines generally denotes poor drainage or foreign body, usually stone. It also, upon rare occasions, is a secondary invader upon an old tuberculous lesion. The same may be said, also, of the streptococcus.

The finding of large gram-positive bacilli in purulent urine almost bespeaks catheter contamination by air-borne bacteria of a residual bladder urine. At times it is due to catheter or back-pressure contamination of an upper tract residuum.

Enormous oval or bacilliform microorganisms parts of which take both the gram-positive and the gram-negative stains bespeak a rectovesical fistula, even in the absence of fecal matter in the urine. These bacteria frequently appear to have a gram-negative background studded with either irregular or round gram-positive areas and are of comparatively enormous size.

Diphtheroids and yeast cells usually bespeak instrumental transmission of infection from without, but the latter is highly suggestive of an associated diabetes mellitus. The typhoid bacillus rarely lingers for any great time after recovery from the disease. Pneumococci are common after

pneumonia and during influenzal epidemics. In the absence of both they rarely are found.

In all cases of pyuria carrying any bacterium one should keep in mind two important infective principles that rule largely in infections of conducting structures. They rarely hold chronic infections in the absence of obstruction or an infective feeder elsewhere, and, to cure them one must remove whichever is present. In this regard, the urogenital tract does not differ from the nose. Many of us can recall the vast assortment of treatments that used to be carried out in so called "nasal catarrh." Today the rhinologist thinks in terms of faulty aeration (obstruction) and poorly draining sinuses (feeders) and not in terms of "nasal catarrh." The modern view of urogenital infections should be identical with this. The mind should be projected beyond the urethritis, cystitis or pyelitis, it should think in terms of obstruction and feeders and should realize that both may play important parts in the same patient. Indeed, with the exception of renal tuberculosis, the entire problem almost narrows itself down to the question of drainage, for the bacterial feeder would not often remain as such if drainage were what it should be. Hence, when one rules out tuberculosis, his entire problem in chronic infections is to find the poorly draining area for, in most countries, even stones rarely are found where drainage is perfect.

### HEMATURIA

It is rare to find any great number of red blood cells in the urine of a normal individual. In fact, except in the presence of calcium oxalate crystals in the urine, or the rare capillary oozing of great congestion, blood in the urine usually is caused by some lesion which, if uncorrected, will cause the loss of either life or health. Such being the case, hematuria is the one urinary symptom that invariably demands exhaustive study to determine its source and cause. To treat it by medicine and rest in bed without careful study, is to be guilty of one of the greatest neglects in all of medicine. To such neglect are to be attributed many avoidable fatalities.

Thanks to the cystoscope and the studies it makes possible, we long since have passed the day when one had any right or justification in assuming that his clinical sense, together with the patient's symptoms, could give him an answer of sufficient sureness to avoid great risk for the patient. And, except in the presence of grave contraindications to cystoscopy, the physician who denies his hematuric patients this most valuable means of diagnosis often will have much to regret.

The older idea that one could tell from the character of bloody urine just where the blood originated has lost many lives. It has practically no place in modern diagnosis, for cystoscopic procedures have shown how fallacious it is. Even those clinical combinations in which we formerly had the utmost diagnostic confidence, the careful urologist views with great misgivings and is unwilling to trust. It used to be thought that "coffee ground" urine was due to renal bleeding when, as a matter of fact, the "coffee-ground" appearance depends upon the reaction of the urine and how long the blood has been in it, the blood may come from any portion of the tract proximal to the membranous urethra. Urine full of bright-red blood was supposed to come from the bladder, yet with almost equal

frequency it comes from the kidney. Blood coming at the end of urination was supposed to come solely from the vesical outlet; we now know that it rather commonly comes from vesical tumor, ulcer or stone. Blood at the urinary meatus between urinations was pathognomonic of anterior

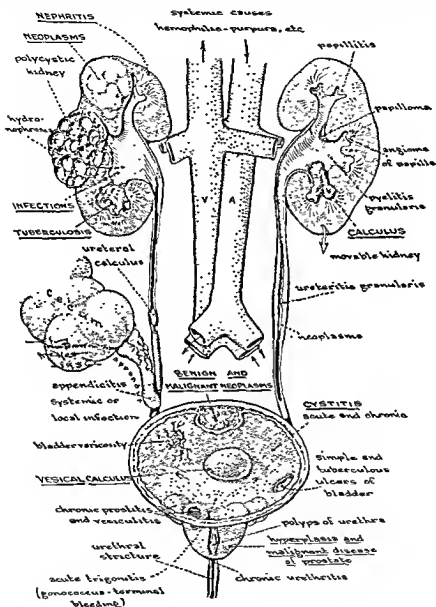


Fig. 111.—Schematic drawing to illustrate the many possible causes for blood in the urine. (Herman, *The Practice of Urology*, W. B. Saunders Co., Philadelphia.)

urethral bleeding, and usually it is, but occasionally it is due to a papilloma in the posterior urethra that is caught in the grasp of the cut-off muscle. And, when we boil it all down to actual fact, we see that symptomatic diagnoses in the presence of blood in the urine almost invariably are a great injustice to the patient, for one rarely has made a diagnosis when he



has determined only the source of the bleeding. Far more important is the cause, and causes rarely are so simply discovered.

As it has been pointed out elsewhere the hematuric patient who presents no acute inflammatory condition of the lower urinary tract and is otherwise a safe cystoscopic risk, should have a cystoscopic study while he is bleeding, if possible. By carrying out such a study during the time of bleeding much needless procedure may be avoided in many patients whose bleeding comes from one or both kidneys. However such a study should be preceded by a careful microscopic observation of the urine to rule out by the absence of blood casts of the kidney tubules, the possibility of hemorrhagic nephritis, and cystoscopy should be avoided in the presence of countless blood casts.

In the presence of profuse bleeding in patients with great prostatic enlargement, known vesical tumor or stone, it frequently is better judgment to check bleeding through putting the bladder at rest by means of continuous catheterization before resorting to a cystoscopic study, which in them, more often is a matter for deliberation than one of emergency.

While microscopic blood in the urine usually calls for both roentgenologic and cystoscopic study, one occasionally may determine the cause and source by a careful microscopic study of the sediment of the first and second glasses of voided urine. As has been said elsewhere calcium oxalate crystals in the urine always are accompanied by a few or many red blood cells and, while it is best to rule out stone by roentgenograms rarely is it necessary to carry out cystoscopic study in their presence, unless there are definite vesical symptoms calling for it.

While there are systemic conditions such as hemophilia, purpura leukemia and the like that may cause hematuria, it is not always safe to overlook the possibility of true urogenital pathology. Also it is not always safe to attribute bleeding to the posterior urethra because the cystoscopist sees blood coming from it during cystoscopy. Not a few cases of renal bleeding have been overlooked in this way.

The occurrence of vesical bleeding from large or small areas of submucosal hemorrhage as the result of focal infections elsewhere in the body, particularly in the teeth and tonsils, is by no means rare. A diagnosis of the condition can be made very readily from the cystoscopic appearance of the bladder but in no other way.

Reference to figure 111 gives some idea of the great multiplicity of causes of hematuria—some grave and others of less importance, and accentuates the great need for accuracy in diagnosis if lives are to be saved.

#### OXALURIA

The occasional finding of a few calcium oxalate crystals in a fresh urine is of no great clinical importance, except so far as it may account for the presence of a few red blood cells or a mild grade of frequency of urination with slight burning during the act. Most frequently, as has been said in several places, a small amount of these crystals are to be attributed to the consumption of quantities of such things as grapefruit, spinach, rhubarb, tomatoes or apples. At times they are due to obstinate constipation or high carbohydrate consumption.

The continued presence of large amounts of calcium oxalate in the urine, in the absence of such dietary causes, is a matter of greater importance. An individual in health does not form these crystals in quantity. They are a symptom indicative of a decided metabolic fault, back of which frequently lurks something of serious import to the patient. They are more common in the neurotically inclined, as are also nutritive disturbances.

Except in those patients in whom there exists that poorly understood colloidal imbalance that is a factor in stone formation, they rarely go on to such a termination. The most common subjective symptoms due to the presence of oxalates in the urine are frequency, vesical discomfort, and urethral burning during urination. There may be sufficient crystals in the urine to cause ureteral block with its attack of renal colic. The older English writers made much of calcium oxalate showers in the causation of renal colic, and it is possible that this does explain a proportion of stone negative cases. The writer encountered such an occurrence in a physician who prided himself on the fact that his garden contained many different varieties of rhubarb.

The eradication of the symptom rests in the discovery and removal of the cause, whether it be dietary, neutrogenic, gastro-intestinal or otherwise.

#### PHOSPHATURIA

The symptom phosphaturia well might be divided into the false and true varieties. Under the heading of *false phosphaturia* should be included those transient increases of phosphates due to dietary or nervous causes and that seeming increase of phosphates due to the throwing out of solution of the earthy phosphates, as the urinary reaction approaches the neutral point or swings to the alkaline side of it.

*True phosphaturia* is a condition wherein the constant percentage of phosphates is far in excess of the average normal. It is only to be determined by a quantitative determination of the phosphates present and should not be due to diet. It may be due to a variety of causes, some of little moment and others of much gravity. It may result from derangement of the nervous and gastro-intestinal systems, grave diseases of the lungs and a number of conditions associated with faulty metabolism.

The recent work at the Massachusetts General Hospital, regarding the association of hyperparathyroidism due to either new growth, cyst or other pathology of these minute glandular structures, with many cases of marked phosphaturia and calcium phosphate urinary calculi, has opened up a new field for thought in such conditions. In such patients there is an increased calcium, a decreased phosphorus content of the blood and an increase of both substances in the urine. Often there are to be seen in roentgenograms of the bony structures, varying degrees of decalcification.

The further discovery of the association of both phosphaturia and stone formation with a dietary deficiency of vitamin A seems destined to bring us much nearer to an understanding of the processes underlying many such cases which, heretofore, have been clinical enigmas.

The marked tendency of urinary phosphates to deposit upon any nidus, such as, blood clot, clumps of bacteria, and shreds of epithelium, makes the condition of considerable importance to the urologist. Particularly is this

true of the precipitated phosphates of the highly alkaline urine of the infections in residual urines

The most common variety of false phosphaturia is that seen in individuals with unstable nervous temperaments between the ages of eighteen and thirty. It is exceedingly common throughout the periods of nervous stress during the course of gonorrhea, particularly if there has been prohibition against meats in the diet. Where no change is made in the diet it is less frequently seen. Usually it can be controlled by those foods or drugs which increase urinary acidity and those that have a sedative influence on the nervous system.

### BACTERIURIA

The term bacteriuria has been used for those urines wherein are found large numbers of bacteria in the absence of pus. The appearance of such urines depends upon the particular bacteria and the numbers present. The urine may range from a practically clear to a definitely cloudy appearance. As has been said elsewhere, if the bacteria are motile, as are the colon and typhoid bacilli, the urine retains much of its discoloration even after centrifugation. If the bacteria are of nonmotile types, they sediment by this procedure and there is present a clear supernatant fluid.

A number of different bacteria have been reported as causes of this condition, notably, the typhoid and colon bacilli, the staphylococcus, streptococcus, *Proteus vulgaris*, *Bacillus lactis aerogenes* and the various hydrogen sulfide forming, air-borne bacteria.

The most common cause of bacteriuria is the colon bacillus and the condition may persist for years in persons seemingly in excellent health.

Typhoid bacilluria is common during the course of typhoid fever but disappears upon its cessation, except, occasionally, in those rare individuals who become typhoid carriers.

In staphylococcus and streptococcus bacteriuria, though the progenitors of those present possibly may have reached the conducting structures of the urogenital tract by way of the blood stream, the condition is not due to a constant supply from that source. The bacteria present grow in the tract itself and they are an evidence of poor drainage in some portion of it, as a rule. If they come from the upper tract one generally has little trouble in demonstrating by either intravenous or retrograde pyelography that there is stagnation of urine, if from the lower tract, residual urine is present in the bladder. The prostate gland, though it may be a bacterial feeder to the bladder, probably never causes a true bacteriuria in the absence of bladder residuum.

Bacteriuria due to the other bacteria named is practically never found in individuals who have not had some instrumentation of the bladder and who have no residual urine.

Our views upon the etiology of colon bacilluria seem gradually to be undergoing a definite change. The work of both Campbell and Helmholtz in small children not only has served to accentuate the presence of definite drainage interference in some portion of the urogenital tract, but has made it almost certain that, in some cases, the original source of the colon infection is from without instead of by the blood borne route. While this is

not in any sense a new thought it has lacked, in a great measure, the proofs they have supplied.

Regarding the colon bacilluria of adults, particularly males, it is apparent that we have laid too much stress upon the bowel as a source of supply of these myriads of bacilli. Apparently these urinary infections originally were blood-borne, but that the steady supply comes about in this way is not supported by recent clinical observation. Were such the case it should not be possible to cure the condition by a marked increase in urinary acidity, as Clark repeatedly has done by the use of a ketogenic diet. He also has shown that the prostate gland may serve as a feeding source to the bladder for continued colon bacilluria and that this infection must receive treatment in some cases if diet is to be of permanent benefit.

The other types of bacteriuria, with the exception of typhoid, generally have some definite urologic perversion underlying them which must be cured if the bacteriuria is to be cured.

The treatment of bacteriuria largely is the removal of the cause and the use of urinary antiseptics, and is discussed further under the several appropriate headings.

### CHYLURIA

True chyluria is due, in most cases, to infestation by the *Filaria bancrofti* (*Filaria sanguinis hominis*), though it may be caused by anything that can exert pressure upon the thoracic duct. Of these latter, tumors, enlarged glands, and tuberculosis of the mediastinum are the most common. Occasionally, the symptom may be due to aneurysm, inflammatory masses, other parasites or trauma.

Being predominantly due to a parasite, it, of course, is found most frequently in those countries of the tropics where this parasite occurs. It is particularly common in India, China, Egypt, and northern Africa. In temperate climates it is rare unless brought from the tropics by the patient himself.

The presence of fat, or chyle, in the urine is due to its escape into either the kidney, kidney pelvis, or bladder from dilated lymph channels subjected to back pressure because of blockage of the thoracic duct.

As has been stated elsewhere, the amount of fat varies with the fat ingested and the proximity to the time of its ingestion. The amount of fat frequently can be made to vary by change of body posture. It is generally increased on the recumbent posture and may be reduced or absent in the upright position. On the other hand, conditions may be reversed.

Chyluria usually is sudden in onset and devoid of other symptoms. Occasionally there is lower abdominal or lumbar pain. There may be macroscopic blood and even blood clots, which, if they arise from the kidney or kidney pelvis, may block the ureters in their passage sufficiently to give rise to a true ureteral colic. There may be weakness and loss of weight, even to the point of exhaustion, but generally health is little impaired.

The diagnosis of the underlying factors depends upon the finding of the *Filaria bancrofti* in the blood or the *microfilaria* in the urine, or upon the discovery of some intrathoracic lesion blocking the thoracic duct.

The prognosis depends upon the cause. In true filarial chyluria, the patient usually continues to live in health and comfort despite the continuance of his chyluria. The prognosis of chyluria from other causes is that of the causal lesion.

If the point of entrance of chyle into the urine is in the bladder, it can be sealed off at times by fulguration or by the topical application of some styptic. If it is in the kidney pelvis or ureter, pelvic lavage with from 1 to 3 per cent silver nitrate solution may check its flow.

Should urination be difficult owing to clotting, the bladder may be irrigated with 5 per cent warm boric acid or 10 per cent sodium citrate solution.

Reduction of fat in the diet and increase in proteins and carbohydrates reduces the chyluria. Consumption of much water dilutes the urine. Arsphenamine, and antimony, and sodium tartrate have given some success in the treatment of filariasis.

Chyluria due to mediastinal pressure depends for its cure upon the curability of the pressure causing lesion. Kidd has advised nephrectomy for unilateral chyluria associated with marked pain or loss of weight. Others doubt the wisdom of a procedure of so grave a nature which removes the symptom but does not influence the cause.

#### PNEUMATURIA

The presence of gas in the bladder generally is due to the presence of an opening between the bowel and bladder. Under such circumstances there usually are some evidences of fecal matter in the voided urine. If fecal matter is not present in such cases, one at least will find, by staining the urinary sediment, bacteria that belong only in the bowel.

Upon rare occasions pneumaturia may be due to fermentation of urine brought about by gas producing microorganisms, such as the *Bacillus lactis aerogenes* or *Proteus vulgaris*. The implantation of yeasts in the bladder of diabetic patients through catheterization may cause pneumaturia.

#### HEMOSPERMIA

The presence of macroscopic blood in the seminal fluid as ejaculated from the urethra has been given a degree of importance that it deserves only with the most extreme rarity. Many years ago someone labelled it an infallible sign of tuberculosis of the seminal vesicles and the bad reputation has clung to the symptom ever since. So rarely does hemospermia occur in genital tuberculosis that one with far more accuracy could say that its presence is highly suggestive that that disease is not present.

As a matter of fact, the presence of blood in the seminal fluid rarely is due to pathology in the seminal system. Almost invariably, the blood is gathered from the posterior urethra as the semen exudes into that portion of the canal. Consequently, the symptom usually points to a highly engorged mucous membrane in the posterior urethra which, generally, is associated with marked prostatic congestion.

That the posterior urethra usually is the source of the red blood cells present can be shown with little difficulty. In the first place, such a person usually has microscopic blood in his urine and he is likely to have more red

blood-cells in his second glass than in the first. Further, digital stripping of the posterior urethra by bringing the finger in the rectum from above downward in the midline on the posterior surface of the prostate, taking care not to touch the seminal vesicles or ampullae, usually will cause the appearance of blood at the urinary meatus. Again, microscopic study of the seminal fluid of such an individual shows the red blood-cells to be around any masses of seminal gel present and not entangled in them. One might say this is due to digestion or destruction within the vesicular gel. Close study, however, will convince him that the red blood-cells rarely are admixed with the fluid portions of the digitally expressed seminal fluid but are to the outer sides of them in the prostatic secretion.

Such being the case, the physician should carry out some very careful additional studies before he attributes the by no means rare symptom of hemospermia to tuberculosis. It is far more common at ages in which tuberculosis of the genital tract is most rarely present. Most individuals presenting the symptom are beyond the age of forty-five. Many of them are in the early stages of prostatic hypertrophy and almost all of these have a marked infection of the gland as well.

In earlier life it most commonly is a symptom of much sexual excitement without gratification, and is accompanied by a marked congestion of the prostate gland. Such a gland usually is large, round, boggy and sensitive and, upon diagnostic massage, emits a large quantity of prostatic secretion which may or may not be free from pus but which always contains red blood-cells.

The symptom, likewise, is seen, at times, in those who continue the act of intercourse for long periods of time, particularly if the preliminary excitations are unduly protracted. Sometimes it appears in the masturbator in whose technic there is a similarly long period of excitation. It rarely, if ever, occurs in the more precipitate masturbator.

The symptom is almost invariably due to capillary oozing in an individual with marked engorgement of the veins of the posterior urethral mucous membrane and occurs when the engorgement of sexual excitement and ejaculation bring about an added strain on their thin walls.

The appearance of dark grumous blood more often is either prostatic or vesicular in origin but, in either event, it rarely is a sign of tuberculosis.

While tuberculosis is rarely the cause of hemospermia it, however, should be kept in mind as a possibility, and every effort should be made to rule it out before local manipulations, which are highly contraindicated by tuberculosis, are carried out. It is with the most extreme rarity that there is true vesicular bleeding from this cause without vesicular swelling and induration, both of which can be determined by rectal palpation. Also, vesicular tuberculosis is prone to be accompanied by either prostatic or epididymal involvement.

The treatment of nontuberculous hemospermia is both hygienic and local. The former, by reduction of those periods of prolonged sexual excitement most commonly causing it in early adult life. Local, through the depletion of prostatic congestion and, at times, by direct applications to the membrane at fault. Usually, the symptom disappears promptly if the individual corrects his sexual habits and the physician carries out very gentle

prostatic massage twice a week. If infection of the gland is not present, these treatments rarely need to exceed from four to six in number. If it is present they should be continued for a longer period.

At times, it may be wise to inject a few drops of 1 or 2 per cent silver nitrate solution into the posterior urethra by means of one of the syringes designed for that purpose. This should not be done for too long a period nor at closer intervals than from 3 to 4 days. Upon rare occasions, topical applications of stronger solutions of silver nitrate through the endoscope may be needful.

In the presence of prostatic hypertrophy care should be taken not to produce free bleeding and, if it occurs, all local manipulation should be discontinued immediately. Otherwise dangerous bleeding may ensue.

If there is the slightest suspicion of either tuberculosis or malignancy, no local measures should be carried out. The amount of blood present is seldom more than enough to redden the ejaculated semen and never is a matter of danger in itself aside from the mental anxiety it may engender.

#### SPERMATORRHEA

For decades the word spermatorrhea has been favored highly in quack medical 'literature' as a bugaboo with which to frighten the simple minded. Coupled with the words 'lost manhood,' the full meaning of which the charlatan alone knows, it has made many poor souls contribute plentifully to the coffers of these inventors of dire, but imaginary, ailments.

As a disease, or as a symptom of disease, spermatorrhea, in the sense that sperm continually escape practically does not exist. But, if it did, there is not the slightest reason to believe that it could in any way influence one's health if it continued throughout his entire natural life. To injure health by the constant discharge of any body fluid the wasted fluid must be of some physiologic value to the individual. Aside from impregnation of the female, semen is of so little importance that even those most fanciful of all dreamers, the manufacturers of biologic products, have ignored it, and what they ignore must be less than useless.

In a few individuals, during sleep the sphincteric fibers at the junction of the seminal vesicle and ampulla of the vas deferens with the ejaculatory duct do relax sufficiently to allow of the escape of very small amount of fluid. This totally unimportant occurrence accounts for the occasional finding of varying numbers of spermatozoa in the morning sample of urine. Upon the rarest of occasions a small amount of this fluid may escape during the day. So rare is this that the writer has obtained sperms in the urethral secretion of individuals who have not had a recent orgasm, not more than a hundred times in all of the thousands of such secretions he has examined microscopically.

The symptom upon which the diagnosis of spermatorrhea usually has been made is not altogether uncommon, but the extruded fluid very rarely is semen. Almost always, it is prostatic secretion which is forced out of an overfilled prostate during the act of straining at stool. Upon very rare occasions in perfectly normal individuals a seminal vesicle may be emptied in this way or as the result of straining to empty the bladder. There may be so little semen ejected into the anterior urethra at such straining or upon

straining at stool, that it only appears at the meatus as a slight moisture some time after the straining has been forgotten. Thus, the patient does not associate cause and effect, but is sure that he has a true urethral discharge.

In older individuals with prostatic obstruction emptying of the seminal vesicles is not so uncommon during the straining to pass urine. At this age, however, one does not greatly mourn the loss, nor does he become neurotic over it.

The person with a tight urethral stricture occasionally empties a seminal vesicle during his straining efforts but, as the semen goes back into his bladder and mixes with the urine, he rarely is aware of the occurrence.

Spermatorrhea, therefore, gets its medical importance from the fact that it may be the pet fear upon which a psychoneurosis is based, and it then becomes the task of the physician to defixate and to reeducate the errant mentality. As these conditions more often are found in individuals with relaxed musculature whose general health is below par, there may be a call for a general systemic building up. But one should not be too diligent in trying to convince his patient that this will eradicate the symptom. Usually it does, but at times it fails to make any change. Most of these individuals have a poorly draining, perhaps infected, prostate gland. A course of prostatic massage may result in the complete disappearance of the symptom. Comparatively few individuals who are having regular sexual intercourse have either "spermatorrhea" or "prostatorrhea."

### PROSTATORRHEA

In common with spermatorrhea, prostatorrhea largely has been a high-sounding word wherewith the charlatan frightened his patient. In his realm these two conditions have been contributing factors to that most telling of all of his grotesqueries, "lost manhood." As a pathologic entity, prostatorrhea practically does not exist. As a symptom of no moment, so far as health is concerned, it rather commonly does.

The prostate gland normally ejects its secretion into the posterior urethra during moments of sexual stress. It is probable that it does the same thing to a far less degree from time to time during each twenty-four hours. If so, it is only pursuing its normal bent. The patient is not aware of it, nor is he harmed by it. Except as described below, it probably never escapes in sufficient quantity between urinations to force its way through even the weakest of cut-off muscles to appear at the urinary meatus. Its natural direction would be through the vesical sphincter into the bladder.

In certain young individuals who subject themselves to much sexual excitement without gratification, there is developed a far greater amount of prostatic secretion than otherwise is the case. There is, at the same time, an associated congestive increase in the size of the prostate itself. Under such circumstances, it is rather a common occurrence for the individual to force some of the secretion, at times some semen, into the anterior urethra when straining at stool. Particularly is this so if the fecal matter is firm in consistency. While this symptom is *more common in individuals with a post-gonorrheal prostatitis*, it is by no means rare in those with a normal prostatic



secretion It, of course, is more likely to occur in persons of poor general muscle tone

Except for the anxiety states which it may engender, the escape of this fluid is of no importance whatever Its possibilities for the development of a psychoneurosis, however, urge the importance of a thorough understanding of the condition by the patient, and no patient should be allowed to go without being informed of its true cause and lack of importance to health

The escape of this fluid at stool urges the necessity for a microscopic study of the prostatic secretion and treatment of the gland if infection is present Even where infection is not present, the symptom usually can be removed by the better prostatic drainage brought about by prostatic massage Under such treatment the gland decreases in size and does not store up such large quantities of secretion Aside from this, attention should be given to the sexual habits of the patient He should be urged to avoid prolonged sexual excitement however occasioned The symptom, like spermatorrhea, is very rare in those who indulge in normal sexual intercourse at reasonably regular intervals

#### ENURESIS IN CHILDREN

Enuresis in childhood is generally a nocturnal malady of considerable annoyance to those who care for the child At times, it is due to some definite physical entity, at others, it is truly of a psychogenic nature In infancy, through a poor or utterly lacking control of the sphincters, the condition may be considered as normal As the child grows he must develop the habit of sphincteric control, must establish that delicate neuromuscular balance that is required for what we call normal urinary function To reach this point there must be a proper adjustment of both voluntary and involuntary or automatic factors The mechanism is a very complex one, and it is not surprising that many children are very slow in developing it to such an extent that it is active during deep sleep Some tenaciously cling to the infantile in many ways but few of these failures to leave in the realms of infancy things appropriate only to that semiparasitic stage of the journey are of so annoying a nature

Before assuming, however, that a given case of nocturnal enuresis is caused solely by the child's failure to discard the infantile, these children should be subjected to the most careful examination to eliminate other and, often, more serious causes To gather one's knowledge from history alone is to court error, for a good proportion of such cases are not of a psychoneurogenic nature Often there exists a pathologic or developmental fault which must be corrected if cure is to be effected Many of these little patients are underweight, poorly developed and anemic In them, the physical state requires correction before one should expect improvement in functions requiring both nervous and muscular development

The studies of Campbell<sup>1</sup> have shown a surprising number of truly urogenital causes for enuresis, and have accentuated the importance of a careful urologic study in all children in whom the enuresis persists in spite of the ordinary means of correction That more than half of his 249 cases presented such lesions is, in itself, proof that the symptom is not to be

<sup>1</sup> Jour Urol, Vol xxviii No 3 (Sept.), 1932

viewed so lightly from a medical standpoint as heretofore rather generally has been the case. So large a proportion of his cases presented lesions of gravity, endangering both health and life, that they reveal striking possibilities for the overlooking of things of the utmost importance.

At times, such things as phimosis, adenoids, enlarged tonsils, pin-worms and the like seem to play a part, in that the enuresis promptly ceases on their correction. Again, the condition may be associated with spina bifida, and this developmental fault should be ruled out in every obstinate case.

It is becoming increasingly evident that urinary tract infections in children are far more common than previously has been recognized, and that many cases of so-called enuresis are in reality urinary incontinence of infective origin. It is therefore imperative that a urinalysis be carried out in every case to exclude such infections.

Thyroid insufficiency at times seems to play a part in enuresis, as evidenced by the beneficial influence of small doses of thyroid extract in some cases.

In the absence of true developmental failures, such as epispadias and spina bifida, the prognosis is good, though the symptom at times persists until puberty. Upon rare occasions the enuresis continues throughout life despite treatment.

The treatment consists primarily in the discovery and correction, if possible, of all physical defects that could have any bearing upon the symptom. This should be done before one falls back upon the simpler explanation of perverted or undeveloped function. The administration of belladonna in small doses, with due regard to individual idiosyncrasy, has proved beneficial in many cases. Small doses of thyroid gland appropriate to the age of the child are highly beneficial where hypothyroidism is a factor and even prove beneficial in some children who present no evidence of such hypofunction.

The injection of salt solution into the sacral canal of those presenting spina bifida has at times proved beneficial, as has also the dissection of the fibrous tissue covering the bony gap in an effort to relieve possible nerve pressure.

Functional or psychoneurogenic enuresis must be combatted by the development of habits both mental and neural, a task worthy of a skillful psychologist. The element of fright rarely should be introduced, but every effort should be made to encourage in kindly ways. The stimulation of personal effort in the correction of the habit either by reward for success or a kindly show of disappointment on the part of the caretaker over failure is far more successful than punishment. Waking the child at intervals during the night to empty the bladder may be necessary during the first few months of this period of reeducation. The earlier these efforts are made the better are the results, as a rule. Relapses, particularly after spells of sickness, are not uncommon and may need the same patient, persistent efforts for correction.

## CHAPTER V

### GENERAL METHODS OF TREATMENT

PERHAPS nowhere else in medicine, unless it is in ophthalmology, is real gentleness more at a premium than is the case in office urology. The urologic office gains a large percentage of highly apprehensive patients who are more keenly appreciative if they are not hurt. Many of the treatment procedures have to be repeated many times upon the same patient and he would be a stoic, indeed, who would continue treatment accompanied by great pain a day longer than, in his untrained judgment, was necessary. Not only does gentleness serve a good purpose this way, but it has even a greater value. The mucous membranes of the urethra are rather delicate tissues often strained to the utmost by disease, and it requires little observation to prove that they react from disease far better if treatment is not of a sort that increases the burden they are carrying.

When one speaks of gentleness in this connection he has in mind not only careful manipulation in the various instrumental procedures. He has just as prominently in mind the fact that even more trauma may follow the application to the tissues of chemicals of a nature that produce great mucosal reaction. For years, this has been one of the greatest faults of urologic treatment. Not only has it increased the severity of inflammatory processes, but often it has been a great factor in the prolongation of them and the causation of new ones.

By far the large majority of urologic office patients are the victims of a type of infection involving some portion of the conducting structures of the urogenital tract. And as one takes a general view of these infective processes, whether in the kidney, pelvis, bladder, prostate or urethra, he finds that the one treatment indication above all others is the promotion of better drainage. Often, this means the promotion of drainage from or through mucous channels of rather diminutive size. The greatest enemy to such drainage is mucosal swelling and one of the surest things to produce such swelling is *mucosal trauma of any type*.

So far as the chemical aspects of treatment are concerned, it is obvious that we have far to advance before we shall be sufficiently removed from some of our old basic thoughts on the subject. We have talked bactericides in urogenital infection for so many years that it is natural that the visual field should be narrowed to such an extent that we should grow to see, on the one hand, a germ, and on the other, something that will kill it. Such a conception naturally tends to foster the exploitation by the manufacturing chemist of almost everything that possibly could kill a pathogenic micro-organism. When these gentlemen start something along this line they do it with a blare of trumpets, and often it takes years for things to be shaken down to actual values. If we could learn to think more of the nudswing of the pendulum than we do of the extremes, we should not be so prone to go to extremes in matters of treatment. In the exploitation of a given bactericide for local use two questions are most highly featured (a) In

how great a dilution will it have bactericidal action? (b) just how much can the patient or tissue stand? As the result of responses to these two questions, advice is given regarding the strength that should be used. This advice might be very valuable if the theory upon which it is based were really correct. But it so happens that there is more to the cure of infection, than the killing of bacteria much as one kills vermin.

Mucous membrane infection usually means that the bacteria have penetrated into the membrane to depths not reached by bactericides applied to its surface. Such being the case, recovery must, of necessity, be a more complex problem than that of killing a few surface bacteria. There must come into play certain deeper tissue or systemic processes which, for present purposes, we may call curative responses. Anyone who has spent much time in watching the struggles of the urogenital mucous membranes against infection is sure to arrive at the conviction that they are very delicate biochemical processes. And delicate biochemical processes practically always have a very narrow range of activity. In fact, they are very much mid-pendulum-swing matters. Rately are they a playground of extremes.

Good judgment should suggest that success in their encouragement could be brought about more fully by an avoidance of extremes in treatment. And, were we to view the matter mainly from this midground, we would meet with far greater success in the treatment of these infections than often is the case. Instead of waiting for years to reduce gradually the strength of the bactericides we use—for we almost invariably start at the strong end of the scale—we should start at the weaker end and work toward the middle.

It should be remembered that our treatment of urogenital mucous membrane infections is still in the empiric stage. We have not the slightest knowledge regarding the true biochemical processes that have to do with the cure of such infections. We do not know what is going on chemically in such tissues, nor do we really know what we should do chemically to aid them. Time and experience have shown us that certain things are of value, but it has taken us many years to sense the fact that, often, the value is greater from things applied to the surface if their concentration is far below what we commonly have used.

One should not expect the manufacturing chemists to be so altruistic as to teach us to use the substances upon which their profits depend in such weak dilutions that there almost are no profits. Nor should we put these gentlemen in the position of seeming pirates by our failure to shake things down quickly to within their margin of greatest efficacy. The history of our experiences with such things shows that, with few exceptions, it has taken ten years or longer to do this. In the treatment of gonococcal infections it took almost fifty years and the thing is not yet where it should be.

Wise is the urologist who keeps these thoughts before him in his treatment of infections, for he will give equal heed to both the possible good and the possible harm that may come from all that he does. He will reach no heights of vanity but will stand in awe and admiration of the marvelous way in which Nature protects her own. He will have the patience that accords to Nature an opportunity; that avoids the panic so conducive to meddlesome procedures. He will do much good and little harm.

## LOCAL MEDICATION OF THE URINARY STRUCTURES

Local medications to the urinary mucous membranes may be divided appropriately by their actions into five types, namely, antiseptic, astringent, sedative, stimulating and destructive. And, while the first, second, third and fifth are rather well understood, there is possible doubt about just what the word stimulating means when used in this consideration. It is probable that much of the good accruing from the use of things that we consider antiseptic comes from their power to stimulate certain biochemical changes in the infected mucous membranes and not from their bactericidal potentialities. Realizing this let us then understand the word stimulating to mean here, that class of drugs that seems to promote healing in ulcerated surfaces. Even here, we find that some of the chemicals which we class as antiseptic lotions, notably silver nitrate eminently promote healing in proper strength solutions or on the other hand they may be destructive in greater strengths.

Each of these actions has its appropriate place in the treatment of the various lesions encountered in the membranes involved. Yet, to try to make an arbitrary division of the substances commonly used would occasion much confusion, for which reason, it perhaps is better to consider the substances and cite their uses. Before going into this, however, it might be of value to discuss briefly the reactions of the various portions of the tract to chemical application.

Beginning with the anterior urethra we find mucous membrane with a marked sensory reaction to even slight irritation. Not only is this true, but this portion of the tract reacts with an outpouring of great numbers of leukocytes very shortly after such applications. This is in marked contrast to the posterior urethra which is poor in pain sense and, apparently, not so ready in purulent response as is the anterior urethra. Judging in silver nitrate strengths we can say that a 1 per cent solution causes great burning pain followed by a marked purulent discharge when applied to the anterior urethra and the posterior urethra accepts an application of even 50 per cent without pain or marked purulent response. So sensitive is the mucosa of the anterior urethra in many individuals that even a 1:3000 solution of silver nitrate causes burning pain and purulent discharge.

Passing on to the bladder we see in its general wall an insensitiveness comparable with that of the posterior urethra and in its trigone even a greater sensitiveness to chemical irritation than is shown by the anterior portion of the urethra.

In the ureter and kidney pelvis we find a greater degree of tolerance to chemical applications than we do in any other portion of the urinary mucous membrane. Here, unless we cause blockage of the lumen, we could inject chemicals of considerable strength without sensory disturbance. There might be an inflammatory reaction resulting therefrom but even this would cause no pain if ureteral block did not occur.

Thus it will be seen that considerable judgment must be exercised in the application of chemicals to these surfaces. Particularly must we respect the trigone and the anterior urethra, for disregard of their high degrees of sensitiveness will be followed by misfortune and needless suffering. If it is our desire to apply strong solutions of any chemical to the posterior

urethra we must, of necessity, take every precaution against any of it coming into contact with either the trigone or the anterior urethral mucosa. In other words, we must make such applications with applicators and not by the injection of fluids. True, we may inject a few drops of 1 to 3 per cent silver nitrate into the posterior urethra with a Keyes-Ultzmann syringe, but we run grave risks in using stronger solutions in this way. Often, the escape of a few drops onto the trigone will cause the most intense tenesmus and, even, urinary retention demanding catheterization.

**Permanganate of Potash.**—This is probably more widely used in urology than any other chemical, though it is not so generally used as was the case some years ago. Because of the forcible way in which it often was applied in the days of high-pressure irrigations, its reputation suffered by having attributed to it the clinical changes that were due solely to the traumatic way in which it was used.

Mildly bactericidal in the strengths generally used (1:8000 to 1:3000), it also is said to have a mildly astringent action. Perhaps its greatest value is its power to cleanse mucous membrane, for it clears it of surface mucus or pus very quickly. Whatever its real action, there is ample clinical evidence to show that it has a very salutary effect upon infections of the urinary mucous membrane. This it does not have because of its bactericidal powers, for the effect is more marked with the weaker solutions, wherein this power is at a minimum. In proper strength it usually is soothing to vesical inflammations. Particularly is this true of the urethrotigonitis of subsiding posterior urethral infection. The speed with which it clears the bladder urine under such conditions often is very striking.

Potassium permanganate is seldom, if ever, used for topical application to the membrane, its use being confined to that of a solution for hand injection or irrigation.

Stronger solutions at times are used for the clearing up of chancroidal ulcerations of the skin surface. For such use strengths of even 1:1000 may be employed and, though they cause some burning pain in raw surfaces, they are very serviceable in the removal of foul-smelling secretions. Potassium permanganate solutions are seldom, if ever, used for lavage of the kidney pelvis and ureter. Not that there is any contraindication to their use, but only that they have not found favor for this purpose, if indeed they have been used at all.

**Silver Nitrate.**—Years ago silver nitrate solutions were used extensively in the treatment of urinary infections. The black of the oxidized silver was a prominent decoration of the treatment room of almost everyone who treated gonorrhea. Today, very few administer silver nitrate irrigations in the treatment of these infections. Its use mainly is limited to the instillation of small quantities into the bladder or the kidney pelves, or to the direct application of varying strengths to restricted portions of the tract.

Where it is indicated, silver nitrate is one of the most valuable and reliable of substances. In solutions ranging from 1:10,000 to 1:3000 it can be used safely as an irrigating fluid in any portion of the tract. In greater strength it causes so much anterior urethral discomfort and burning as to be decidedly unpleasant to the patient. The bladder, however, is tolerant to strengths up to 2 or 3 per cent and the direct deposition of these

strengths into the posterior urethra and bladder often has marked curative value. When thus used, silver nitrate should be injected by means of a catheter or like instrument so that none of the solution comes into contact with the urethra distal to the cut off muscle. Solutions of this strength cause no sensation in the posterior urethra, and seldom more than a transient burning sensation, with desire to urinate, when injected into the bladder. If deemed necessary, 5 per cent solutions can be injected directly upon the desired area through a ureteral catheter but there should be fluid in the bladder to dilute the solution as it leaves the bladder wall.

Apparently, the kidney pelvis and ureter are more tolerant to silver nitrate solutions, as 5 per cent has been used repeatedly by injection through a catheter passed into the kidney pelvis without reaction. If used thus, there should be fluid in the bladder to dilute it as it reaches that viscus.

Silver nitrate should not be injected in any strength into a tuberculous bladder as it makes the patient worse in even great dilutions and causes alarming symptoms in the greater concentration.

Silver nitrate finds its greatest field of usefulness when applied directly to the membranes of the posterior urethra which as it has been said are highly tolerant to it. Such applications usually are made on cotton wrapped applicators through the endoscope, and solutions ranging from 5 to 50 per cent are used according to the effect desired. Beyond 20 per cent strength, silver nitrate exercises a cauterizing effect.

For a more limited destructive effect silver nitrate is fused on a wire applicator and applied directly to the area to be affected. Tissue moisture is sufficient to assure caustic action but much caution should be exercised to limit its effect and the urethra should be mopped dry with a cotton wrapped applicator before the endoscope is withdrawn, a precaution which should be carried out whenever any great strength is used in this portion of the canal. Particularly is this true with strong solutions which, otherwise are tracked into the membranous and bulbar portions of the canal as the endoscope is withdrawn.

A word of warning against the too frequent use of strong solutions of silver nitrate in the posterior urethra is highly appropriate. It is rather a common occurrence to study patients who for months or even years have been subjected to such treatments. At times, the entire posterior urethral mucosa has a deep bluish color from oxidized silver. Frequently, the verumontanum is entirely gone, and the posterior urethra and bulbar mucosae are of the glistening white appearance so characteristic of Nature's effort to protect herself by the building up of a thick protective layer of squamous cells. Such patients commonly have a constant urethral discomfort, usually psychogenic, which no amount of local treatment will remove. Also their first voided urine generally contains many squamous epithelial cells.

**Mild Protein Silver (U.S.P.)**—While there are many proprietary preparations of mild protein silver, each bearing the cost of great advertising they have no definite advantage over the official pharmacopeial one. Indeed, it is the writer's firm conviction that, at least so far as gonorrhea is concerned, the official preparation is greatly to be preferred.

The introduction of mild protein silver has been a great boon to urology.

for, though it has no marked bactericidal activity, it has a decidedly salutary effect upon many local infections when used in appropriate strengths. Just how this occurs is not known but there is ample clinical evidence to the effect that it is true.

Taking, then, the official mild protein silver (U.S.P.) as a standard, it is safe to say that its strength in acute infections, and often in more prolonged ones, should be 5 per cent or less. Particularly does this apply to gonorrhea, wherein it is a simple matter to demonstrate by a study of the two-glass test, that stronger solutions do not show such good results. True, some patients seem to stand these greater concentrations well but they are definitely in the minority. At times, patients do better on even 2 or 3 per cent solutions.

Regarding the frequency of their use there is some difference of opinion but the writer, from years of observation, is convinced that patients with gonorrhea do far better on one or two treatments in 24 hours than on a greater number. He is further of the opinion that solutions of mild protein silver exert a greater curative influence if applied to a mucous membrane that has been cleansed with either 1:8000 permanganate of potash or some other mild irrigating solution.

The colloidal silver preparations, with their definitive limitations in bactericidal effect, offer much evidence to suggest that germ-killing properties are of secondary importance and that the tissue reaction to them is the thing of highest value.

In order to be of the greatest use mild protein silver should be kept in contact with the membranes for some time. In anterior urethral application it is customary to have it held in for from five to ten minutes. For bladder use it usually is retained until the next urination.

Aside from its direct influence upon the infected mucous membranes, mild protein silver often is of great value in inhibiting bacterial growth in retained urine. It not infrequently happens that a single injection into a bladder containing a foul-smelling urine will be followed by a disappearance of the objectionable odor.

**Neosilvol.**—This milder colloidal silver salt seems to find its best place in the treatment of nongonorrheal anterior urethritis. Apparently, it is inferior to the official mild silver salt in the treatment of gonorrhea. At times, it produces a good curative response in stationary cases of gonorrhea but soon loses its influence. Substituted for a few days for other silver salts in such cases, it often does much good. Making a yellowish white solution without staining qualities it has much to recommend it for temporary patient use. It is used in 5 or 10 per cent solution and, even in the latter strength, is less irritating to the anterior urethra than is half that strength of mild protein silver (U.S.P.).

**Strong Protein Silver (U.S.P.).**—This substance is much more irritating than are the mild silver proteins and is used in much greater dilution. It finds its greatest field of usefulness as a prophylactic against gonorrhea when it is used in 2 per cent solutions and in the treatment of anterior urethral gonorrhea in solutions weaker than 1 per cent.

Its use in 2 per cent solution as a prophylactic is prone to occasion a urethral discharge for a short time, for which reason it should not be re-



peated more than once or twice, and the patient should be forewarned of this purulent response. In 0.25 or 0.5 per cent strength it may be used one or more times daily. In such strengths it makes a good preparation for the patient's own use, as it does not stain as do most mild silver proteins. It should not be used routinely in greater strengths than 0.5 per cent as it has a decided tendency to produce and sustain a urethral discharge in such concentrations.

**Mercurochrome 220**—Though practically useless in the treatment of gonorrhea in the male, mercurochrome is of some value as a local antiseptic. It finds its greatest use in urology as a bactericide in cases of retained urine. Injected into such bladders in a 1 per cent solution it produces at times a striking reduction in the bacterial content of the urine. Like many other bactericides, it more often is equally disappointing.

Mercurochrome also is of some slight value for cleansing the urethral canal prior to instrumentation and as a bactericide to be left in the bladder after cystoscopy whenever residual urine is proved or suspected. In concentrations stronger than 1 per cent it is highly irritating in the anterior urethra and often in the bladder. It has the misfortune of producing stains that are difficult to remove.

Its intravenous use is fraught with marked dangers from the mercury contained. Many unfortunate cases of poisoning have resulted therefrom and there is little, if any, real scientific basis for its use in this manner in urologic office practice.

**Neutral Acriflavine**—In some quarters acriflavine has gained considerable reputation in the treatment of gonococcal infections. Upon its introduction it produced much harm by virtue of the fact that in even 1:1000 solutions, at times it painlessly produces ulcerations of the anterior urethra that may be potent factors in later stricture formation. It never should be used repeatedly in that strength. It is more safely used in strengths of 1:4000 or 3000, but even then it has a tendency to keep up a mucoid discharge for a long time.

As a preventive of infection from instrumentation, it is valuable as a urethral injection and, left in the bladder after cystoscopy, in the strength of 1:4000 to 1:2000 it is of definite prophylactic value.

As an injection in 1:3000 solution it is almost a specific in the presence of *Trichomonas vaginalis* infestation of the urethra.

**Boric Acid**—Boric acid is not so frequently used in urologic practice as it formerly was. It is decidedly weak in bactericidal values but, as a bladder irrigation, it often produces decided improvement. In the presence of marked cystitis it exerts at times, a soothing influence upon the bladder when some of the more commonly used solutions have failed. Used in 5 per cent solution, it has valuable detergent powers, and in warm solutions of this strength it is of value in the removal of clotted blood from the bladder.

**Bichloride of Mercury**—The strong chloride of mercury finds but little use in present day urologic practice. It has, however, a kindly action at times as an irrigation to the intolerant tuberculous bladder. Used in the strength 1:20,000 it occasionally gives great relief to these sufferers.

**Acetic Acid**—The local use of acetic acid in urology is practically con-

fined to the destruction of the so-called venereal warts. Applied carefully to these growths, the glacial acid is highly destructive. It is better to make several applications to them than to try to do too much destruction at one treatment. Care should be taken to mop off any free acid. It shows little tendency to harm the normal skin surrounding the papillomatous excrescences.

Another very valuable means of removing these growths is a mixture composed of acid salicylic 4 grams and acetic acid 30 c.c. This creamy mixture is applied to the warts until they are covered well with it. It is then allowed to dry. Small growths usually disappear within a day or two.

**Oil of Gomenol.**—This vegetable oil usually exercises a powerful sedative effect upon the highly inflamed bladder mucous membrane. It is generally used in 20 per cent strength in olive oil. Producing only a slight burning sensation to the anterior urethra, it may be injected gently into the bladder by means of a bulb syringe, or may be introduced through a catheter. It is often soothing to the tuberculous bladder and is an excellent thing to leave in the intolerant bladder after prolonged cystoscopy.

Following the fulguration of the areas of panmural cystitis (Hunner ulcer) it gives the patient much comfort. An ounce or more should be injected into the bladder and retained as long as possible.

**Guaiacol and Calomel.**—A mixture composed of liquid guaiacol 3 per cent, and calomel 5 per cent in olive oil, is even more soothing to the highly inflamed bladder than is gomenol. This, too, may be injected through the urethra, where it produces only a slight burning sensation. Few chemicals for local use are more potent for relief in the presence of vesical tenesmus following intravesical procedures. If fear is entertained that the calomel, which quickly settles out, may act as a nidus for stone in the presence of residual urine, the calomel safely may be omitted from the mixture.

**Phenol.**—If for any reason it is deemed unwise to introduce oil into the bladder, much relief can be had by leaving a 1 per cent carbolic acid solution in the bladder until the next urination. In this strength it has a marked sedative effect upon the inflamed bladder and, apparently, it does no harm to the mucous membrane.

**Carbolfuchsin.**—The application of Ziehl-Neelsen solution of carbolfuchsin to painful chancroidal ulcerations often relieves the pain almost instantly and it markedly promotes healing. After a few days, however, it seems to lose its influence upon healing and, if a 1 per cent gentian violet solution is substituted for a short while, the carbolfuchsin applications may be made again with marked benefit. By alternating these two dyes in this way, it frequently is possible to clear up these ulcerations promptly and with little discomfort to the patient. They, however, do not compare in their results with the Robbins and Seabury method of fulguration through 25 per cent solution of copper sulfate. The recently reported use of sulfanilamide for such ulcerations suggests that both these methods may come to have a limited use.

**Zinc Salts.**—It is the writer's opinion that astringent injections have no place in the treatment of gonorrhea. In this disease they are a distinct social menace, in that they give the patient a false sense of security in the

presence of infection. Almost, they are things to give the patient psychological comfort and to "save the doctor's face." Medicine should not need such things to gain and hold the patient's confidence. To their use thousands of unfortunate women owe their gonococcal infections. There are better ways of controlling gonorrheal discharge, ways that promote cure and do not hide symptoms. The call of the day is to keep patients sufficiently interested in their infections to follow treatment to cure, and this is in no sense furthered by methods that conceal.

In nonspecific urethral discharge such astringent substances occasionally are of value. Particularly is this so in the presence of the more profuse mucoid discharges of unknown etiology that fail to clear up under the more commonly used plans of treatment. The most commonly used zinc salt is the sulfate and it frequently is prescribed as shown in the following prescriptions.

|                             |                 |
|-----------------------------|-----------------|
| Zinci sulfatis,             |                 |
| Pulvis alum                 | aa gr iv-vii    |
| Acidi carbolic              | M iv            |
| Aquae dest                  | q.s. ad fl ʒ vi |
| Sig. Use by local injection |                 |

|                             |                 |
|-----------------------------|-----------------|
| Zinci sulfatis              |                 |
| Plumbi subacetatis          | aa gr iv-vii    |
| Aquae camphorae             | fl ʒ i-ii       |
| Aquae dest                  | q.s. ad fl ʒ vi |
| Sig. Use by local injection |                 |

#### THE MEANS WHEREBY LOCAL MEDICAMENTS ARE APPLIED

There are numerous means in common use for the application of medicaments to the urogenital mucous membranes. In all of them there is a need for both gentleness of procedure and good judgment if one would avoid doing more harm than good. Some of them are carried out during the presence of acute mucosal inflammation and some of the infections causing the inflammatory reaction easily may be spread to other regions by a lack of understanding of the mechanical factors at play. Complications of a serious nature may be readily precipitated or great prolongation of infection may be due solely to unskillful methods of application.

So true are these things and so much have they had to do with the incidence of disease complications, chronicity and sequelae in the past, that he who essays to carry out local medication to the urogenital structures should know just as much about their possible dangers as about their virtues. For this reason, a full discussion of them is of great importance.

**Irrigations.**—For many years the use of the hydrostatic irrigations was a highly favored plan of treatment for various bladder and urethral conditions. Unfortunately, they had their greatest wave of popularity in the days when the value of gentleness in diseases of these structures was not so fully appreciated as it largely is today. In those days, and to some extent in these, as has been said, disease commonly was blamed for complications and sequelae that were, in reality, due to treatment. Particularly was this true with gonorrhea. Gradually, this fact began to dawn upon a few of the gentler souls in urology and they started to carry out some clinical

comparisons. Shortly they discovered that patients who were not given irrigations, as then carried out, had fewer complications than did those in whom they were carried out. As the result of this, a cry was heard throughout the land that irrigations for the treatment of gonococcal in-

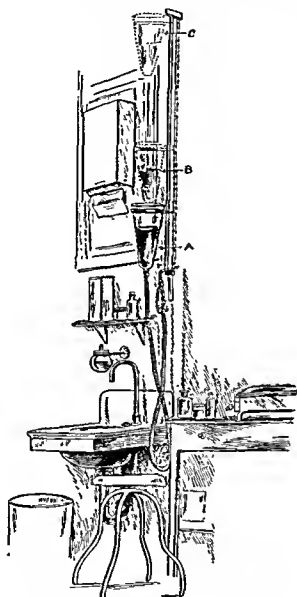


Fig. 112.—Author's treatment outfit. *A*, Position of jar for anterior irrigations. *B*, Position of jar for posterior irrigations. *C*, Dangerous pressure for gonococcal urethritis.

fections were almost a menace and should not be used. Thus did one of the most valuable methods of treatment gain an unenviable reputation, much of which it still holds.

Apparently, it did not occur to those clinicians that the trouble might not lie in the irrigation but in the method of its use. If it did, the fact is

not in evidence in their writings, for they score the hydrostatic irrigation without any qualifying remarks. As a matter of easy clinical proof, that is just where it did lie. For it was then the practice, and in some quarters still is, to place the fountain from which one gave his irrigation anywhere from four to seven feet above the urethral level. One who has had any amount of experience with the pathologic processes resulting from the back-pressure of any of the various obstructive uropathies is sure to sense one thing, viz. the tract was not built with a view to standing any amount of expanding pressure even in the absence of true urogenital disease. And, in the presence of disease, this pressure expansion picture is greatly magnified.

If the disease be of an infective type the spread of infection and the addition of complications is a common result. Such being the case, it was to be expected that hydrostatic irrigations under high pressure would change for the worse the clinical picture of an infective disease. The world, however, would have been better off if those who have decried the irrigations as a menace had gone a few steps further and discovered that it was not the irrigation that was doing the harm. When it was not the high pressure (which it usually was) it was the irritating quality of the substance used. Briefly stated, it was trauma to a tract not built to stand it, usually at a time when it was strained to its utmost ability to carry on.

No such dire results follow hydrostatic irrigations of the lower urogenital tract if the fountain from which the pressure is obtained is not more than three and a half feet above the urethral level and the fluid used is not highly irritating to the mucous membrane. And there are times, particularly in acute anterior urethral gonorrhea when only two feet of water pressure is much to be preferred. Consequently, we safely and truthfully may dismiss the question with the statement that, if high pressures are avoided and chemical trauma shunned, the hydrostatic irrigation is one of our most valuable modes of treating the mucous membranes of the bladder and urethra and their infections, and it is practically devoid of danger.

When the hydrostatic irrigation method of treating the lower tract was under quite a cloud of discredit some clinicians developed the idea of overcoming the pressure to the urethra by passing into it a small rubber catheter through which the fluid was allowed to flow. This gave free exit to the fluid along the catheter and was a very good idea except that the constant passing of catheters into the gonorrheal urethra caused complications to occur or caused such a change in the urethral mucosa that the patient had shreds in his urine for months and months thereafter. And sometimes the shreds continued to carry gonococci. In other words, a makeshift devised to banish one fault in treatment injected others, perhaps not so dangerous, but equally as annoying, so far as gonorrhea is concerned. For a gonorrheal mucous membrane resents trauma of any type and has its curative responses retarded or destroyed thereby.

With these dangerous factors removed the word "irrigation" in the present connection means the *flushing of some portion or all of the lower urinary tract with some considerable quantity of fluid under a hydrostatic pressure of three and a half feet of fluid or less.* It further implies the ut

*most gentleness of manipulation and the use of chemicals in nondevitalizing strengths.*

Irrigations of the lower urinary tract are of two types, to wit, anterior irrigation, in which only the urethra distal to the cut-off muscle is treated, and posterior, total, intravesical or deep irrigation, in which the fluid is allowed to flow past the sphincters into the bladder.

The position assumed by the patient during irrigation may be one of several, all of which are equally effective, so that either is a matter of individual preference. Standing at a sink or basin is unquestionably the simplest, cleanest and most convenient position. It requires less preparation on the part of the patient and offers less likelihood of staining his clothes or person by the solutions used. It has one disadvantage, however. The nervous patient who has been shocked by the news that his trouble is really gonorrhea often shows a tendency to vasomotor disturbances dur-

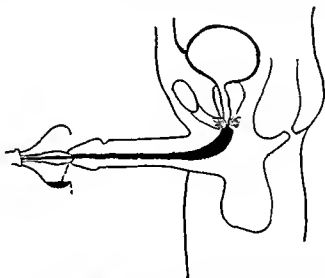


Fig. 113.—Anterior urethral irrigation. If the fluid pressure is kept low the tonic contraction of the cut-off muscle will prevent escape into the posterior urethra.

ing his first treatment. He may even faint, so that he should be watched carefully and the treatment stopped on the first sign of faintness. It is extremely rare to have this repeated at subsequent treatments. The same thing may happen to the patient in a sitting position, but is of no moment to the patient lying down.

Much loss of time and annoyance is avoided if the physician equips his office for giving his patients irrigations in the standing position. If this is to be done at a sink it is well to have the top of sink placed not more than 28 inches from the floor. This avoids the necessity of having short patients stand on a platform, a thing always in the way. So many of the irrigating solutions used have skin-staining qualities that the patient in a sitting or reclining position frequently has much staining of the inner sides of the thighs. Also, these patients more often get clothing stains. A list of the substances most generally used has been given in the section on local medication.

*Anterior Irrigations*—In carrying out irrigations to the anterior urethra one should think first of the amount of intraurethral pressure that is safe for the condition being treated and should gauge the height of the fountain accordingly. Particularly is this true of acute infections by the gonococcus wherein it is seldom wise to subject the canal to more than two and a half feet of pressure. Also one carries out anterior irrigation for treatment only of that portion of the canal and it often happens that even this pressure maintained for a short while will cause some of the fluid to enter the posterior urethra. This is of the greatest importance in gonorrhea involving the anterior urethra alone since the infection readily can be carried into the posterior urethra in this way. One should be particularly careful in this regard with patients who ever have had posterior irrigations for they often relax the cut off muscle on the slightest intraurethral pressure.

In giving anterior urethral irrigations one should make sure that the fluid really is reaching the entire anterior portion of the canal for it is a simple matter for one to get the idea this is being done when actually no fluid may be entering the canal. The nozzle should be placed in the urethral opening the canal very gently filled and the fluid allowed to escape. One should avoid the rapid rocking of the nozzle against the opening with the irrigating fluid flowing. While a lot of fluid flows in this way little of it goes into the urethra or if it does the column of it again is subjected to pressure before the canal can empty itself and there is great likelihood of forcing the sphincter and sending fluid into the posterior urethra. In gonorrhea of the anterior urethra the canal should be treated clear to the bulbomembranous junction for which reason one's results depend largely upon attention to such little matters of technique.

The frequency with which anterior irrigations should be carried out is not always an easy matter to determine. The anterior urethral mucous membrane is an extremely delicate affair and it is a simple matter by over treatment to put its immunity responses entirely in abeyance or to bring about a change in its surface cells that makes for continued urethral discharge or shreds in the urine. The microscope however offers us a ready means of checking on the question of too much treatment. The urethra that is overtreated sheds many of its epithelial cells as has been said in several places so that one safely can conclude that a urethral secretion showing much epithelium is being chemically traumatized provided there is not a stricture present. Thus when any quantity of epithelial cells appears in a urethral secretion one should reduce either the number of irrigations or the strength of the solution being used.

*Posterior Irrigations*—In carrying out posterior urethral irrigations one first should wash out the anterior urethra carefully. When this is done the irrigating nozzle should be held firmly in the external urinary meatus so that no fluid can escape around it and the fluid should be allowed to fill the anterior urethra so that it exerts its pressure against the cut off muscle. One should not use sufficient pressure to force the sphincter for which reason the patient must relax it. The more nervous and apprehensive the patient the more trouble does he have in relaxing his sphincters. No muscle action in the body hangs on a more delicate thread than does this

one. It needs but the thought on the patient's part that he cannot relax it to make him unable to do so. The psychic battle encountered often is a tedious matter to both the physician and the patient. Success often rests upon trivial things, but, once having been gained, intravesical irrigation usually is a simple procedure thereafter.

As a rule, the larger the irrigating nozzle and bell one uses, the more trouble does he have in giving such an irrigation. It is very interesting to see with what ease a cut-off muscle opens to less pressure with a very small nozzle and bell that refused to do so with a more cumbersome apparatus. In fact, by using a small bulb syringe and almost no pressure one can pass fluid into the posterior urethra of almost every patient who cannot relax when a larger instrument is used. The more fuss one makes over a posterior irrigation the less often will he succeed on his first effort. Even too much effort on the part of the patient may prevent success easily gained

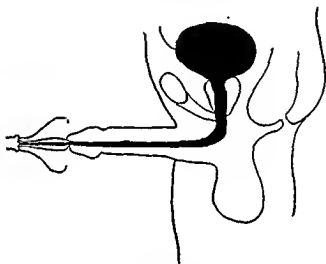


Fig. 114.—Intravesical hydrostatic irrigation. Best carried out with a fluid pressure of not more than  $3\frac{1}{2}$  feet.

when his mind is taken from the matter by conversation. The patient relaxes his sphincter by trying to pass urine and he should be told to do so without straining.

If one is not able to succeed at the first effort he should not increase the pressure to the point of forcing the sphincter if the gonococcus is present and he wants to avoid complications. In nongonorrheal conditions the amount of pressure is not necessarily of such great importance. It is safe to say that no gonorrheal urethra ever should be subjected to more than three and a half feet of fluid pressure. This, likewise, is a good rule with the strictured urethra if rupture would be avoided. Under other circumstances, four or, even, five feet of pressure is not attended by great danger, though it seldom, if ever, is needed.

In the absence of acute infections, one who has failed may even lower the tank, instruct the patient to try it himself, and leave the room. The delicate muscle balance makes it rather easy for the patient who under-



stands what he is trying to do to carry out such an irrigation alone better than he can in the presence of another, and he requires far less pressure. He should be instructed not to overfill his bladder and, if he avoids this, he cannot do himself as much harm as the physician may do, providing the pressure fountain is lowered sufficiently.

In judging of the frequency of posterior irrigations one must think really in terms of anterior urethra, for the posterior urethra and bladder are far more tolerant structures and are not so subject to overtreatment. As regards the strengths of substances used, however, one must include the trigone in his considerations as this area is almost as sensitive to chemical irritation as is the anterior urethral mucous membrane and it causes far more discomfort when it is irritated. As a rule, it is well to leave some of the irrigating fluid in the bladder to be voided at the next urination.

**Anterior Urethral Injections**—Unquestionably, our best means of applying medicaments to the mucous membrane of the anterior urethra is the so-called hand injection. Modern usage has discarded for this purpose the older piston syringes and has substituted the far safer glass syringe with a rubber bulb ejector. While this syringe may be used for both anterior and posterior urethral medication by the physician, it is unsafe to place it in the patient's hands for the latter purpose.

Properly instructed, a patient may medicate his own anterior urethra with perfect safety. Before doing so he should cleanse his canal by urination and very gently should inject the proper amount of fluid into it. Usually it is digitally held there for five minutes or more, then allowed to escape.

It is to be remembered that the cut off muscle is very easily forced by this means if too much fluid is injected and infection may be spread to the posterior structures that otherwise would not occur. Thus, it is important to bear in mind that the average anterior urethra is fairly well distended by 10 c c of fluid. In the small urethra even this amount causes overdistention with the consequent forcing of some of the fluid past the cut off muscle. Thus if safety is courted no more than 5 or 6 c c of fluid will be used. With this amount of fluid in the urethra the tonic contraction of the sphincter is such that none of it will pass into the posterior urethra no matter how long it is retained.

As a matter of fact, good urethral treatments can be carried out with less than 6 c c of fluid, and the best size syringe for patient use is the  $\frac{1}{8}$ -ounce size. With it he can do himself no harm whereas he commonly does harm despite the most careful instructions if he is given a larger syringe.

Elsewhere has been considered the frequency of such medication that is advisable, but in prescribing substances for patient use, regard must be paid to the staining qualities of the chosen chemical. Patients rarely become so proficient as to warrant their feeling safe when given fluids having the tell tale staining qualities of mercurochrome, mild protein silver, acriflavine and like substances.

**Instillations**—In urologic parlance the word 'instillation' is used to designate the injection into the posterior urethra of medicinal substances.

by means of a syringe carrying a long curved cannula. To make it mean other things, as is sometimes effected, is to court confusion. The instrument first used for this purpose was the Keyes-Ultzmann syringe. As has been said in the description of instilling syringes, the cannula of this syringe was small and the fenestration in the end caused it to have a dangerous presenting surface capable of causing much urethral trauma. This fault largely has been overcome by the use of the Bangs' cannula, which is larger and not so likely to injure the mucosa.

The cannula is passed through the anterior urethra as is the urethral sound. It meets the obstruction at the cut-off muscles, its tip is slightly

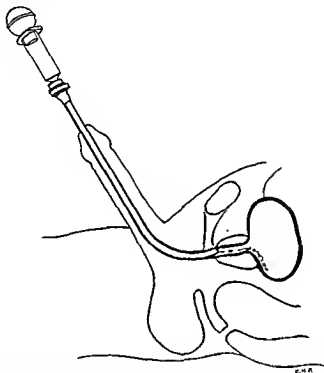


Fig. 115.—Introduction of fluids into the posterior urethra and bladder by means of the instilling syringe. If the posterior urethra alone is to be medicated only 4 or 5 drops of fluid should be injected.

raised and one feels that it has entered this sphincter. The instrument is allowed to pass through the membranous urethra only so that its tip rests at the junction of this sphincteric area within the posterior urethra. One should exercise the utmost care in this regard, for, unless the fenestration has passed the sphincter, the fluid injected flows into the anterior urethra. Many of the substances used for instillations are intended for that more tolerant expanse of mucous membrane in the posterior urethra and cause great burning and irritation if instead they escape into the anterior urethra. Many of these substances have marked staining properties.

If one desires to influence the mucous membrane of the posterior urethra only, he injects not more than five drops of fluid. If, on the other hand,

he desires that some of the fluid flow into the bladder he uses a much larger amount

When solutions that are highly irritating to the anterior urethra are being used it is well to have a small column of air in the syringe above the fluid so that this forces all fluid from the cannula at the end of the injection. In this way one avoids irritation by fluid trickling into the anterior urethra as he removes the instrument

Instillations do not carry so great a degree of favor as they did in the days when it was believed that posterior urethritis *per se* was a common condition. Today, the thoughtful urologist views the condition of the posterior urethral mucous membrane largely as a mirror of the influences of infections in other regions. More particularly does this apply to the state of the prostate gland and instead of thinking that chemicals applied to the posterior urethra will clear up its infection he tries to remove the feeding foci in other structures with the belief that the urethra will cure itself if this is done. Surely he does not believe as his forefathers did that instillations into the posterior urethra can influence to any degree infections in the prostatic acini

In some quarters it has become the custom to inject antiseptic solutions into the bladder by means of an instilling syringe after massage of the prostate gland. This is a simple and easy procedure which can be done even more safely by means of hydrostatic irrigation or the use of a bulb syringe. The frequent passage of solid instruments through any urethra is a mistake wherever it can be avoided. In the presence of gonococcal infection it is highly dangerous and has caused postgonorrheal strictures in many patients who otherwise would not have had them. Also it has caused many complications of the disease. Even in the nongonorrheal canal it is a mistake. It traumatizes the mucous membrane and favors the conditions accounting for the constant presence of shreds in the urine a thing causing the patient much mental unrest as well as being very difficult to cure.

As a means of introducing into the posterior urethra and bladder substances that are highly irritating to the more sensitive anterior urethra it is invaluable but here its utility rests

**Topical Applications**—In a number of conditions involving both the anterior and posterior urethra it becomes desirable to make applications of medicaments to strictly limited areas of mucous membrane. In view of the fact that these treatments require the use of the urethroscope a description of them will be found in the section devoted to Urethroscopy

#### URETHRAL INSTRUMENTATION

There are a number of things that should be in the mind of any one who passes instruments of any type into the male urethra for this procedure is not always so devoid of danger as one might be led to assume. Not only is there the danger from the direct trauma that so easily results from unskilled manipulation but there is a great danger from infection. Upon extremely rare occasions there is the possibility of precipitating a state of shock that has cost more than a few lives.

In any consideration of the subject one should start with the patient

himself, for there are types of individuals in whom the passage of instruments through the urethra is, in reality, a major procedure fraught with great danger to both life and health. To a degree this matter has been discussed under the contraindications to cystoscopy, but no harm will be done by repeating some of the points here.

It hardly seems necessary to say that the extremely nervous, apprehensive patient, no matter what his state of health, is more liable to the milder grades of vasomotor disturbance resulting in fainting and, upon rare occasions, in those more profound symptoms bearing the name of shock. The pale, nephritic individual past fifty years of age, particularly if he has the slightest dyspnea, is not a good subject for urethral instrumentation. His predisposition to immediate or delayed shock is such as to urge caution. He should not have an instrument passed in his urethra unless it is absolutely necessary and he should not be dismissed immediately after it is done. The more pronounced his physical appearance of cardiorenal embarrassment, the poorer risk is he. Also, usually he has little resistance to infection.

Almost as poor an instrumentation risk is the individual with an active pulmonary tuberculosis. Commonly such patients have a reaction that seems peculiar to them alone. In fact, it is so out of conformity with other reactions due to these procedures that its occurrence is almost positive proof of pulmonary tuberculosis. The writer has seen but one case offering an exception to such a rule. It differs in point of time from the febrile conditions mentioned below. Just about twenty-four hours after the urethral instrumentation such a patient develops a rise in temperature, often as high as  $104^{\circ}$ . He has a marked increase in cough and other evidences of pulmonary disease and he remains in this condition for from one to six weeks or longer. He usually regains his former condition with great difficulty and slowness. Sometimes he dies after weeks of struggle. It should be remembered that this reaction does not apply only to the occasional patient with an obviously active pulmonary tuberculosis. It, at times, occurs in those in whom pulmonary involvement had not been suspected prior to the reaction.

Another extremely important consideration in urethral instrumentation is the question of infection. Not only does the anterior urethra always contain pathogenic bacteria, but it is lined by a mucous membrane that offers little protection against their introduction into the system by either lymphatic or blood-stream transference as the result of direct trauma. The most usual evidence of such a shower of bacteria is the so-called urethral chill and fever. This comes on almost invariably within from four to ten hours after the trauma, lasts for some hours and promptly subsides. It seems in every way analogous to those seizures which follow a large protein injection and possibly is due to bacterial proteins. It has been said that there invariably is an associated pyelonephritis. If so, it is a very transient affair, and one who has seen much pyelonephritis is prone to suspect the accuracy of such a conception.

In contradistinction to this fleeting febrile condition is the one wherein no one would doubt the existence of a true pyelonephritis and in which the patient is desperately sick for a long time—a condition that often lasts

to the death of the patient. This ailment, naturally, is more likely to occur in the weak and debilitated or in the aged, but it occasionally afflicts individuals in seeming robust health. In the latter it is more likely to occur in those with urethral stricture. Such urethras abound in bacteria of many types and offer exceedingly poor barriers to systemic infection.

With such an array of unpleasant and, at times, dangerous possibilities following urethral instrumentation, it is obvious that it should not be an offhand, haphazard procedure, particularly in those past middle life and in the tuberculous. Because of its ever present infective possibilities, it should be done with the utmost gentleness and before it is done the anterior urethra should be rendered as nearly germ-free as it is possible to do. It has been shown beyond the least possibility for doubt that most of these infective aftermaths can be avoided by the most careful urethral cleansing immediately before instrumentation.

No amount of urethral cleansing will prevent reaction in the presence of pulmonary tuberculosis which, from the frequency of its occurrence and the time factors involved, would suggest that causes other than urethral bacteria were at play.

From an infective standpoint one should realize that no matter how careful may be his asepsis in the passage of instruments into the bladder containing residual urine, some bacteria usually will be carried into the bladder from the urethra, and the pool of bladder urine will be infected. Often, this is a very serious matter for the patient. And in such patients, not only should one think in terms of anterior urethral cleansing but he is wise if he makes it a point to leave a few ounces of some good, nonirritating bactericide in the bladder when he has finished. If such patients are infected, the condition may range from a few days of cystitic symptoms with mildly elevated temperature, to a fatal pyelonephritis.

Aside from the dangers of urethral instrumentation looms the pain of the procedure which rarely is a matter of much moment. So much of it has to do with patient apprehension that it can be reduced greatly by patient assurance. This is rather well shown by the fact that it is rare to see a patient who complains greatly about the second passage of an instrument unless someone passed the first one roughly. True urethral hyperesthesia is an extremely rare condition if, indeed it really exists. The question is largely one of skill and gentleness on the part of the physician and lack of apprehension on the part of the patient.

In a patient free from fear, the passage of a proper-sized instrument in sufficiently gentle hands causes a burning sensation in the anterior urethra and a little more discomfort as the beak passes through the two sphincters. Anesthesia rarely is necessary, certainly where gentleness of manipulation holds. If the pain were great it could not be obliterated easily by a preliminary distending of the canal with distilled water or salt solution. The writer has done this with many patients in whom real urethral anesthetics have been used by others and had the patient extol the values of the local anesthesia (?) afterwards.

The sensitive portions of the canal are mostly on its floor and, if one makes the beak of the instrument follow the roof, taking particular care not to rake it over the bulbomembranous junction, the verumontanum or

posterior vesical lip, and to avoid pressure on the trigone when it has entered the bladder, he will avoid the quick twinges of pain of the first three and the continued discomfort of the trigonal irritation.

**The Urethral Sound.**—There was a day in urology when the passage of the metal sound into the urethra was supposed to be one of the most valuable of curative measures for a large assortment of urogenital ills. These ranged from impotence to urethrisms and from urethral gonorrhea to prostatic infections and even those of the seminal vesicles. Men dreamed that the dilatation of the urethral caual by this instrument could accomplish the most impossible of things and the procedure became one of the commonest in the urologist's "bag of tricks." It was the thing surest for the patient, unless the patient happened to be a physician, when it became in his eyes a needless torture. And, what with ill-advised use and far too common lack of skill in its passage, the harm that the sound has done is beyond calculation. So great was the fear instilled in the minds of the laymen that the wise urologist today keeps his urethral sounds hidden from the patient's sight to avoid apprehension on his part.

Obviously, most of us have come to a saner point of view regarding the uses of the urethral sound, and do not employ it so promiscuously as was once the practice. There still are some physicians left, however, who glorify it far above its just deserts and who use it where and when it should not be resorted to. There are few surer ways of driving patients away from much needed treatment than the too frequent or the unskillful use of sounds. Where indicated they are invaluable, and few procedures give greater dividends for gentleness than does the passage of a solid instrument into the urethra.

Instead of being needed in the treatment of most patients, the urethral sound actually has a rather limited field of usefulness. It, of course, finds its greatest field in the dilatation of urethral strictures and the encouragement through stretching of a better epithelialization of unhealthy areas of the urethral mucous membrane causing shreds in the urine. More often, these shreds are the result of deeper pathology not amenable to cure by such treatment. In the early period of median-bar formation the passage of full-sized sounds frequently will provide a greater ease in statting the urinary stream, possibly the temporary reduction of vesical outlet discomfort and delay the time when the bladder fails to empty itself completely. In rare cases, the passage of sounds reduces urethral discomforts, more often it increases them. Finally, the sound is of use in one's efforts to uncover possible latent gonococcal foci in a seemingly cured patient.

The sound is a menace in all stages of gonococcal infections. Not only does it spread infection, encourage complications, and favor chronicity but it is one of the chief causes of stricture formation. It is an instrument of danger in prostatic hypertrophy and carcinoma. Undoubtedly, its only influence in disorders of the sexual fuocion, if indeed, it ever does help, is entirely of a psychic nature. Its use in massaging the small, shotty remains of formerly infected urethral follicles is largely chimerical. These are the fibrotic remains of former infection and need no massage. The symptoms attributed to them are caused by other things.

No one who is not thoroughly familiar with the ropographic anatomy

of the male urethra should try to pass a sound. The possibilities for harm, particularly with sounds of small sizes (20 F or smaller) are so great that it is a simple matter to do damage that may be of the greatest danger to the patient. And, until one has developed the proper degree of skill in this regard, he should view any solid urethral instrument as one with great traumatizing possibilities. Above 20 F the size of the instrument tip is of such diameter that great trauma results only from roughness in manipulation.

The inimitable Deaver used to ask his class, 'How do you pass the urethral sound?' And the class was expected to answer in unison, 'With gentleness.' There could be no better answer, for gentleness is the surest way in which to avoid injury.

Perhaps the two greatest faults in urethral instrumentation are speed and the heavy-handedness resulting from the too firm grasping of the instrument. When one grasps such an instrument firmly he destroys the acuteness of his tactile sense and is unable to appreciate fully the impulses conveyed from the tip of the instrument along the shaft. If, on the other hand, the instrument is held with only enough firmness to keep it from falling from the hand, one finds that his finger tips immediately inform him of the slightest resistance to its passage. In other words, he knows just what he is doing with his instrument in the normal-calibered canal. If there is a narrowed urethral meatus or a stricture band grasping the instrument, it, at times, will interfere with his tactile sense and should cause him to use even more than his accustomed degree of gentleness.

Though one be ever so gentle and skillful in the passage of urethral instruments, he easily may produce a false passage by the use of solid instruments of small diameter. Because of this, as has been said elsewhere, most urologists use the bougie when sizes smaller than 20 F are required. Its flexibility is such that it rarely does any harm to the urethra and it probably never creates a false passage.

Before any instrument is passed into any urethra the canal should be cleansed with some nonirritating bactericidal solution. One who neglects this precaution should expect a goodly percentage of urethral chills and some true cases of pyelonephritis. As has been said, even the normal urethra harbors numbers of pathogenic bacteria—always the staphylococcus and, often, the streptococcus. The urethra of the patient in whom sounds are indicated usually contains a greater variety of bacteria and, undoubtedly, greater numbers of them. Also, it usually has a less resistant mucous membrane, and frequently the individual is in greatly reduced health. Too great aseptic precautions hardly are possible.

In the passage of any type of rigid instrument through the urethra one must keep in mind certain anatomic factors. The most important of these are the normal curvatures of the urethra, the cross bands on the floor of the anterior urethra, and the facts that the floor of the bulbar portion lies on a considerably lower level than does the opening into the membranous urethra, that the posterior vesical lip may so overhang the floor of the posterior urethra as to make the opening into the bladder lie much above the level of the urethral floor, that the upper or anterior contour of the urethra presents almost an unbroken line from the meatus to the bladder,

and that the membranous portion of the urethra is its most fixed portion. The direction of the posterior urethra is that of the long axis of the body, the bulbar portion is almost at a right angle to the body axis and the penile urethra follows any direction the operator desires. One also should bear in mind the fact that an insulted sphincter goes into spasm and, if he tries to pass a sound through the cut-off muscle swiftly, he causes tonic contraction on the sound and experiences the sensation of a stricture of large caliber. This contraction does not occur when sounds are passed slowly.

**The Technic of Passing Sounds.**—With the patient lying on his back in as relaxed a condition as is possible, the tip of the well-lubricated instrument is made to enter the meatus and is slowly advanced along the canal.

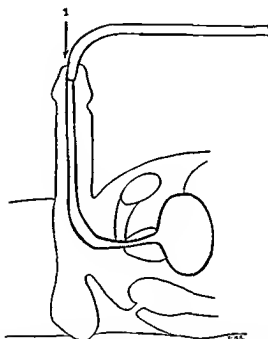


Fig. 116.—Introduction of the urethral sound with the Thomson quarter curve. With the penis perpendicular to the long axis of the body and pulled slightly upward to obliterate its normal cross bands, the sound, with its shaft parallel with Poupart's ligament is passed slowly as depicted.

To obliterate the cross bands on the floor of the urethra the penis is kept on a stretch and the tip of the sound is gently made to follow the anterior wall of the canal. During the first part of this procedure the shaft of the instrument is held parallel to the Poupart's ligament and close to the abdominal wall. As the tip of the curved sound passes along the pubic arch the shaft is carried to the midline of the body and gradually raised so that its internal end may follow the curve of the bulbar portion of the urethra. When the shaft reaches a point at right angles to the long axis of the body the tip usually is against the bulbomembranous junction. If the beak of the sound has followed the floor instead of the urethra it must be lifted about a quarter of an inch to make it present at the opening. This may be done by withdrawing the instrument a fraction of an inch and raising the



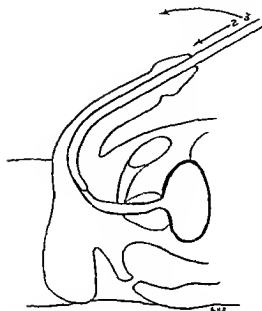


Fig 117—When the beak reaches the above position the shaft of the sound is carried toward the midline and slowly raised in the direction of the arrow marked 3 while it is being progressed further

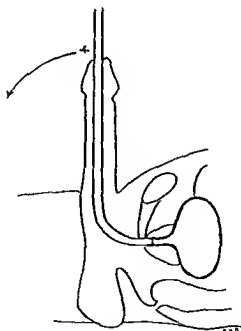


Fig 118—The tip of the sound having reached the bulbomembranous junction it is pulled upward about  $\frac{1}{4}$  inch under the pubic arch or pushed upward with the finger in the perineum. By gentle pressure inward it will be felt to pass through the external sphincter. At this point the manual end should be carried in the direction of arrow 4 to compensate for the direction of the posterior urethra

tip by carrying the manual end of the instrument further away from the body, by raising the instrument as it hooks under the pubic arch or pushing it up with the finger against the perineum.

As the tip of the instrument presents at the cut-off muscle a moment's resistance is felt. The sphincter rather quickly relaxes and the sound tip passes into the posterior urethra. The manual end of the instrument then is carried further away from the body and carefully depressed between the thighs. At this point one should combat the tendency to press too firmly on the sound until his tactile sense tells him that it has entered the bladder. The sound, then, is carried further down between the thighs until the shaft lies in the long axis of the body. At this point the urethral curves are obliterated and the instrument can be pushed straight in.

One knows that the beak of the instrument is in the bladder by his ability to rotate the instrument tip from side to side. If the bladder is empty this manipulation should be done with caution, as it is a simple matter to injure the bladder mucosa in this way. As one's experience

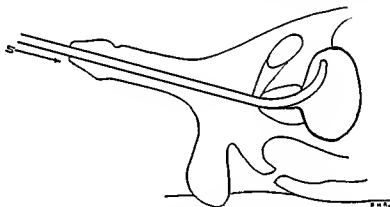


Fig. 119.—When the shaft of the sound has been brought practically in line with the long axis of the body it should be pushed straight inward.

increases he does not find it necessary to carry out this rotation to assure himself that the instrument tip is in the bladder. By paying the strictest attention to the sensations transmitted to his fingers during the passage of urethral instruments, he reduces the liability to urethral trauma, avoids pain for the patient and gets an excellent idea of the pliability of the urethral wall.

In the presence of urethral stricture even greater care should be taken against the possibility of trauma, and one should not exert any great amount of force to advance the sound until he is sure that the tip of the instrument really is in the stricture opening. This may be readily determined by slightly withdrawing the sound to see if any sensation of resistance to withdrawal is transmitted to the fingers by the grasp of the stricture on the sound. In the presence of more than one stricture it often is a very difficult matter to assure oneself whether or not the beak really has entered the lumen of the more deeply placed stricture. Particularly is this true with the smaller-sized sounds and, if any doubt exists in the physician's

mind, he does best not to advance the sound further. He is much safer if he withdraws the instrument and resorts to an instrument with a filiform guide, such as the Le Fort sound or the Philips catheter, and continues to use them until the strictures are sufficiently dilated to allow of the passage of the larger-sized sounds or bougies.

The frequency with which sounds should be passed is still an unsettled question. It used to be the custom to allow a five day interval. This undoubtedly was an arbitrary rule, but it was not a bad rule. The too frequent passage of instruments has a definite tendency to change the type of the anterior urethral mucous membrane cells from the normal columnar type to the protective squamous cells. This may not be a matter of great moment to some patients, but to others it is, for the squamous-lined urethra often becomes a urethra of which the nervous patient is perpetually conscious. Whether this is really due to the mucous membrane change or to psychic fixation on the part of the patient is a question, but the fact remains that the patient who is perpetually urethra conscious is a real medical problem. It is probable that at least three-day intervals should be allowed between the passage of the sounds if the treatments are to be carried out over any length of time. If bleeding has occurred it is wise to wait longer before repeating the procedure.

**Technic of the Passage of Catheters**—Contrary to the passage of a rigid instrument into the urethral canal, as a rule, very little skill is required to pass flexible instruments into the bladder. More often, it requires greater judgment to choose the type of catheter that one needs rather than the acquisition of much skill in passing it.

If one is using a catheter with the stilet in it, it is of course in the class of rigid instruments, and is to be passed under the same technic as has been described for the passage of urethral sounds. It, however, is rather rare that a stilet in a catheter is needed, as most catheters pass better without one. The passage of the usual soft rubber catheter through the urethra might be called a blind operation, because one merely starts the catheter in the urethra and then gently pushes it along until it either obstructs or passes into the bladder cavity.

*In the absence of stricture of the urethra the usual points of obstruction of the catheter are at the bulbomembranous junction or at the vesical outlet.* Usually it is the safer procedure to choose a soft rubber catheter for the first effort and, if it fails to enter, to choose one of the several types of woven catheters. Of these, the most commonly used is the catheter with either a single or double elbow. The advantage of these catheters is that the slight upward curve near the tip has a tendency to make the catheter ride over both the bulbomembranous junction and the average amount of obstruction that may be encountered at the vesical outlet. This is particularly true if one uses the double elbow catheter in which the tip of the catheter more easily follows the roof of the urethra.

The question of the size of the catheter more commonly is to be settled by the size of the urethral meatus, because, in the absence of stricture, any catheter that will pass through the urethral meatus almost always will pass into the bladder, providing it is of a type that will ride over any obstruction at the bulbomembranous junction or vesical neck. As pre-

viously has been pointed out, unless the catheterization is carried out in an operating room where aseptic precautions are ideal, it is a good rule not

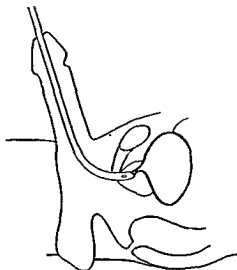


Fig. 120.—Soft rubber catheter blocked at the prostatic commissure.

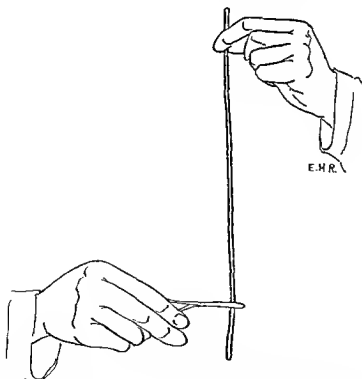


Fig. 121.—Moorhead's method of introducing a soft catheter into the bladder without manual contamination. The catheter is grasped by sterile forceps.

to touch with the hands any portion of the catheter which goes into the posterior urethra or the bladder cavity. With the soft rubber catheter this

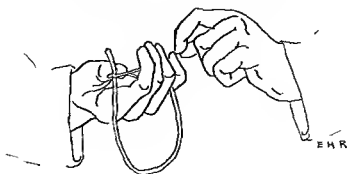


Fig 122—The flare end of the catheter is held between the little and ring fingers as depicted

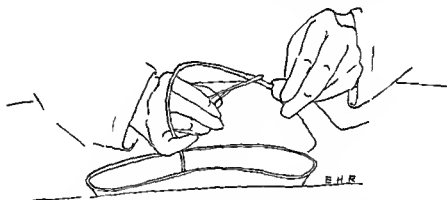


Fig 123—The hand is turned over and the catheter carefully fed into the urethra by means of the forceps

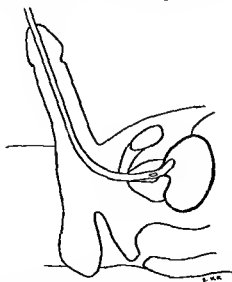


Fig 124—Diagram to show the manner in which the single elbow catheter surmounts minor grades of median prostatic lobe obstruction

easily can be avoided by the use of a pair of thumb forceps in the manner depicted in figures 121, 122 and 123. On the other hand, one can hold the so-called woven catheter in sterile gauze or cotton, with the hand.

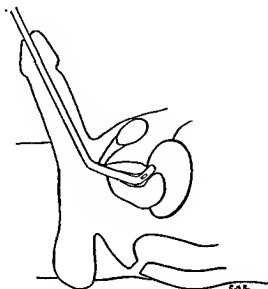


Fig. 125.—Drawing to show how the double-elbowed catheter tip follows the roof of the posterior urethra and rides over median prostatic lobe obstruction.

In order to empty the bladder the eye of the catheter must be in such position that the posterior bladder wall does not quickly close it. For this reason, it should not be passed far into the bladder but should be pushed in until it draws urine and then very gradually pulled out until the urine ceases to flow, after which it should be pushed in about one-quarter

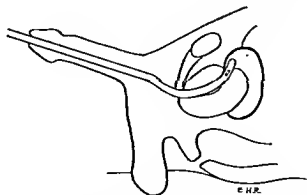


Fig. 126.—Diagrammatic representation of an overcurved catheter entering the bladder in the presence of median lobe prostatic obstruction.

to one-half inch, which brings it just inside the vesical outlet. This is particularly important if one desires to use the catheter as an indwelling one, in which case it might be repeated that the soft rubber catheter is the only ideal instrument to use as an indwelling catheter.

**The Indwelling Catheter**—The use of the indwelling catheter in urologic hospital practice is one of the commonest of procedures. However, in ambulatory patients conditions occur that make the use of this type of catheterization preferable to intermittent catheterization. And it is highly important that one know its dangers and how one might avoid them. It should be understood that there are some patients in whom an indwelling catheter cannot be endured no matter how desirable such a procedure may be. On the other hand there are patients who get along well with one type of catheter and are subjected to the greater annoyance by another. Continuous catheterization therefore depends for its success upon a number of factors not the least of which is the patient.

Patients with unstable nervous systems and those truly neurotic rarely have much success in this direction. Their inability to defecate the mind

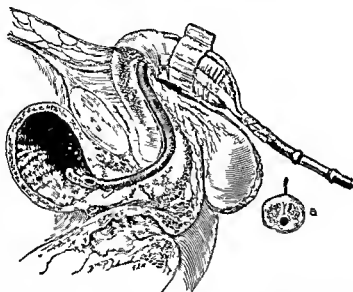


Fig. 177—Diagrammatic representation of an indwelling catheter properly located in the bladder and the method of anchoring it there. (Young's Practice of Urology W. B. Saunders Co., Philadelphia)

from the urinary tract magnifies sensation into discomfort or discomfort into pain so that they either will not or cannot allow the catheter to remain. Upon rare occasions one may overcome this psychic barrier to success by the generous oral administration of nerve sedatives at times as strong as opiates, during the first few days until the patient gets more accustomed to things. More often such individuals remove the catheter and refuse to have it replaced.

In contrast to such patients the stolid well poised individual who can keep his mind on other things frequently gets along very well with an indwelling catheter. As is stated elsewhere the writer had the opportunity of caring for a man of big affairs who wore an indwelling catheter for eleven years. His mind was so busy with things outside himself that he thought of the catheter only when the usual sensations informed him it was time to remove the catheter plug and empty his bladder.

Aside from the possible psychic factors, there are other considerations that frequently militate against success in those unfortunate individuals who cannot voluntarily pass urine and who must not be subjected to operation. Fortunately, this group that cannot stand operation is growing smaller year after year. Our better knowledge of the causes of death in such individuals not only has brought about a highly specialized type of preoperative preparation, but it has been instrumental in leading to the making of some type of operation reasonably safe for most of these sufferers. As the result of this, the list of those whose lives depend upon the urethral catheter is made up of three types of individuals, namely: Those who have had an attack of acute urinary retention and, because of some important physical reasons, cannot be operated upon. Those in whom the hopes of surviving an operation are almost nil. Those who refuse to have an operation. And in either type the physician who cares for the case seldom has a pleasant experience during the time of the catheterization.

Faced with such a case, the physician has a number of things to consider. Not only has he to consider the type of mind and nervous system the patient has, but he must decide whether it would be best to carry out intermittent catheterization until the patient grows tired of it before resorting to an indwelling catheter. For, to the neurotic patient, repeated catheterization grows rather irksome and serves to bring him to a more favorable state of mind. Again, one must decide whether or not it is best to have the bladder drain continuously into some type of urinal or to have it plugged in such a way that the patient can empty it as necessity demands. The latter is by far the better if bladder intolerance does not make it impossible.

A catheter in any urethra and bladder is a foreign body and different mucous membranes register different degrees of reaction to it. Some soon become tolerant of the continued insult and others never do. Always, there is urethral infection, no matter what may be the precautions against it. In some patients this causes no more trouble than a urethral discharge along the catheter and some edema of the urinary meatus. In others, there is profuse discharge associated with fever and, in some, there is fever without any great amount of discharge. He who has a chill and a temperature rise of short duration usually ceases to have repetitions of it if the catheter fastening is so arranged that the anterior urethra can be irrigated with some bactericidal solution with the catheter in situ and this is done daily until the urethra becomes more tolerant.

The person who, despite such precautions, has a continued fever must have the catheter removed. Such individuals commonly have an associated pyelonephritis and will die if the catheter is not taken out. Sometimes they do so under any circumstances.

Whether or not a patient can get along well with an indwelling catheter depends, aside from those factors mentioned, upon careful attention to little things. In the first place, the position of the catheter in the bladder is a matter of much importance. The part of the bladder that rebels most against the catheter is the trigone, and it is highly important that the instrument be placed in such a position as not to make pressure in this region. The old rule that the catheter should be passed well into



the bladder, withdrawn until no fluid comes through it and then pushed in half an inch, cannot always be relied upon too much. This commonly brings the eye of the catheter into such a position that the trigone is sucked into it when the bladder is almost empty. One commonly does better if he pushes the catheter back an inch or more. Also, he does well

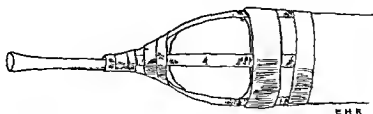


Fig 128 Diagram showing the method of retaining a catheter in the urethra by means of adhesive plaster

to choose for the purpose a catheter with more than one fenestration. Often he will serve the purpose of comfort if he uses an elbow catheter. Such a catheter usually assumes a position that does not allow it to touch the trigone.

One never should use a woven catheter but should choose a very soft rubber catheter of such a size that it rests easily in the urethra without



Fig 129 Glass catheter plug

stretching it in any way. Too large a catheter is highly dangerous for it prevents urethral drainage and brings about toxic absorption. It may be the sole cause of a continued fever. The ease with which one can reduce such fevers in many individuals by attention to the anterior urethra alone gives ample evidence that this is the most likely place of such absorption.

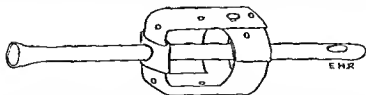


Fig 130—Rubber apparatus for retaining an indwelling catheter

There are many different ways in which a catheter can be held in the urethra but one should avoid anything that lies so close to the urethral meatus that it prohibits drainage. The most usual method employed is adhesive plaster strapping and in applying such a retaining medium, one need have no hesitancy about entirely encircling the penis with it provided he does not constrict a long prepuce.

Before passing the catheter in such a case the anterior urethra should be cleansed carefully with some mild bactericide, some of which should be held in the urethra for a short time. This cleansing may be done by the use of a bulb syringe and some of the bactericidal solution should be gently passed into the posterior urethra. The catheter then can be passed and strapped in place. It is well, when the catheter is in situ, to wash out the bladder with 1:8000 potassium permanganate solution or 1:3000 neutral acriflavine solution. Some of either may be left in when the catheter is plugged. Instead of these, one may use 5 per cent mild protein silver solution, which often has a decided sedative and bacteriostatic effect.

In the presence of definite bladder intolerance or cystitis the bladder should be washed at least daily with the permanganate of potash solution or a 2 per cent boric acid solution until the condition quiets down. Catheters should be changed every four or five days, oftener if there is much utethral

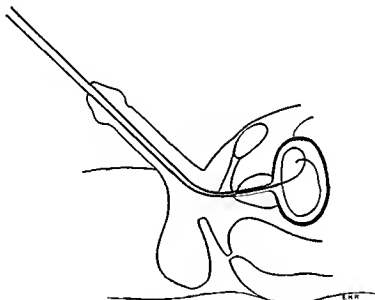


Fig. 131.—The Le Fort sound and filiform in passage.

discharge. Much of one's success depends upon the intelligent use of things to combat mucosal inflammation and infection, and the wise physician will maintain a very close watch upon such a patient until he has established a safe degree of tolerance to the catheter and to the inevitable infection associated with it.

Under the best of circumstances, the life that depends upon an indwelling catheter is a hazardous one; a life in which neither the physician nor the patient dares take any long chances. And the physician to whom the patient should cling is the one who knows most about his particular reactions to the various things with which such a life is fraught. Upon the recognition of the importance of little things, often, does the duration of such a life depend.

**The Use of Filiforms.**—In the presence of very narrow strictured areas in the anterior urethra it often is not possible to pass anything except the

smallest of bougies through them. It was for this purpose that the whalebone filiform bougie was devised. Of recent years the woven bougies carrying a female thread into which the male thread of a larger following instrument may be screwed have largely supplanted those made of whalebone. These latter, however, are of greatest value in some few cases wherein it is not possible to pass those of the woven type. As previously has been said, the woven filiforms and followers are much to be preferred whenever their use is possible since they do not traumatize the face of the stricture, as so commonly happens when the Gouley tunneled catheter is passed over the whalebone filiform.

In the use of the whalebone filiforms it is customary, after thoroughly cleansing the anterior urethra, to pass a number of them into the urethra

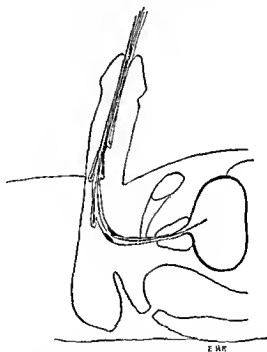


Fig. 132—Drawing to illustrate use of whalebone filiforms. Each filiform is tried in turn until one passes into the bladder.

until they meet with obstruction. Each one in turn is then tried until one finally passes into the bladder. While manipulating them the urethra is kept well stretched by pulling the penis upward so as to straighten out the normal cross bands on the urethral floor. It is sometimes a tedious matter requiring much time, and trial after trial with each member of the group of filiforms before one is caused to pass the stricture. Upon rare occasions it is not possible to cause one to enter. Under such circumstances, a later effort should be made if there is not a dangerous degree of vesical distention from urinary retention. Getting a filiform through some strictures seems more a matter of luck than skill and one should not give up and resort to operation on one trial alone.

At times, after one has tried woven filiforms, which do not lend them-

selves so well to use in a group as do the others, has then tried whalebone filiforms and is about ready to give up in despair, he tries the woven type again and succeeds. To succeed may avoid a serious operation for the patient, for which reason one should not desist too soon. If the patient is able to pass his urine at all it is far better to make a good effort to get a filiform through the stricture and, if not successful, to try some hours later or, if possible, on the following day.

In the use of the Gouley catheter over the whalebone filiform, as has been said, one should exercise the greatest care not to break the filiform, for these small bougies are rather fragile and are split and broken easily by the Gouley catheter. The breaking off of a filiform in the bladder, however,

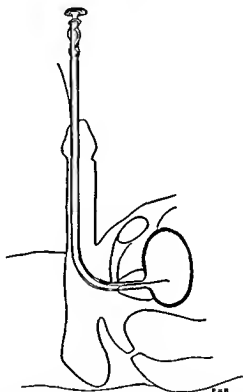


Fig. 133.—Passage of the Gouley tunneled catheter over a filiform guide.

is not the serious thing that it was in precystoscopic days. Then, one opened the bladder to get the piece of filiform. Now, he merely goes on with his gradual dilatation of the stricture and, some weeks later, when a cystoscope will pass, he has no trouble whatever in grasping the filiform in the cystoscopic forceps and removing it. Under the heading of "Urethral Stricture" the uses of filiforms in dilatation have been discussed further.

*The Use of the Bougie à Boule and the Acorn Sound.*—These two instruments, the former flexible, the latter rigid, are used for the same purpose, that is, the diagnosis of strictured areas in the urethra. The tapered end of the instrument frequently will pass through a stricture if an appropriate size of instrument has been chosen. As it is withdrawn the blunt shoulder will give a definite hang in the strictured area. After cleansing of

the urethra with an antiseptic solution one should choose the size of instrument that will go through the meatus and pass it gently into the urethra until it meets with obstruction. If it will not pass through the strictured area a smaller size is taken until one is found that will pass through. By this procedure one not only learns of the presence of the urethral stricture but is able to choose the appropriate size sounds for its dilatation. These instruments also are of value in the efforts to prove cure of gonorrhea as

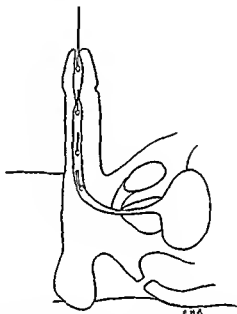


Fig. 134—The diagnosis of urethral stricture by means of the bougie à boule

will be seen under that heading. Their use is confined solely to the anterior urethra as they give no information in the posterior urethra.

#### EXTERNAL HEAT AND COLD

That perhaps oldest of all curative measures heat has a wide application to conditions of the urogenital tract. Not only is this because of its pain relieving qualities but for its relaxing and vasodilating actions as well. Applied by means of the hot water bag, electric pad, the heat lamp, the heat cradle or by direct immersion in hot water it serves many useful purposes and favors the reduction and resolution of inflammatory processes. In the presence of suppurative conditions it hastens the breaking down of the process so that surgical drainage may be instituted more quickly. It is particularly useful in epididymitis, vesical discomforts or inflammations, acute prostatic inflammations and the like.

External heat no matter how applied should not be continued for too long a period and it is well to instruct the patient for whom the hot water bag or electric pad is most convenient to remove it for an hour or two several times in the twenty-four hours. This is especially true where applications of heat are used on the extremely sensitive scrotal skin for epididymitis.

External applications of cold by means of the ice bag also find considerable value in inflammations of the lower urinary tract. Some few patients obtain far more comfort from the use of the ice bag in the presence of vesical or epididymal pain than they do from heat. So true is this that one does well to turn to cold wherever heat fails to give the hoped for relief. Like heat, cold should not be applied continuously for long periods of time. In the presence of renal, vesical or urethral bleeding cold, in conjunction with rest, often is of the greatest service.

**The Hot Sitz Bath.**—The hot sitz bath has many virtues for a large number of urologic patients and does not deserve the neglect that has been accorded it. The tendency to drift toward the newer methods of treatment, both medical and physical, often causes us to overlook useful and tried methods of a simpler sort. As a consequence, patients commonly are denied much easily obtained comfort. It requires little observation to show the value of such baths. They should be used with caution, or not at all, in patients with cardiovascular disease; the possibility of fainting in the bath should be considered in all patients with any instability of vasomotor control. All patients should be instructed to get out of the bath on the slightest suggestion of fainting or dizziness.

The method of giving the sitz bath is for the patient to sit in water reaching to the crests of the ilia. The water should be of a degree of heat just below the limit of skin heat tolerance, of which the patient is the best judge. The temperature of the water should be maintained by the frequent addition of more hot water and the bath should be continued for from fifteen to thirty minutes. Such baths may be repeated two to four or five times in twenty-four hours as indications and results suggest.

The influences of such baths are, obviously, sedative, relaxing and antiphlogistic. They exercise a kindly influence on the various annoying sensations and painful conditions of the lower urogenital tract. The patient with any bladder disturbance associated with frequency and vesical discomfort often may obtain marked relief of symptoms for some hours following such a bath. The same is true of many painful conditions of the prostate, urethra and scrotal contents.

The individual with acute retention of urine often finds himself so much relieved by heat that he is able to void while in the bath. So true is this, that such baths have a definite place in the effort to avoid the dangers of catheterization of some patients, and they should be tried wherever possible before the catheter is resorted to.

The favorable influence of the hot sitz bath in all stages of gonorrhea does not receive the attention it merits. Not uncommonly, the disease quickly is rendered milder and cure is markedly hastened. This is particularly so in the infections of women and children. Indeed, in the latter it has been used by many thoughtful workers as the sole treatment for vulvovaginitis. The speed with which it allays the local inflammation in many cases is equal to that of those newer forms of treatment, sulfanilamide and the hormones, though it is not so quickly curative as are these when they are successful.

**Application of Rectal Heat.**—The close proximity of the prostate and seminal vesicles to the rectum makes it rather a simple matter to treat in-

flammatory conditions in them by the use of heat applied by one means or another. And in these days of seeming heat madness it is but natural that such treatment of infections in these structures should receive considerable attention by the medical profession and, particularly, by those keen men of business who gain a livelihood by manufacturing things for the application of it. With the latter egging the former on, one would expect just what exists today in the realms of "heat-science." In the first place we have a profession convinced through centuries of usage that heat is a valuable therapeutic aid. In the second, we have a group of business men trained to produce dividends but not to weigh clinical results. That they should be willing to believe medical reports no matter how poorly they are founded on true scientific investigation, is a thing to be expected. And, if one takes the trouble to survey the medical literature upon this subject he finds much of it valueless because of its loosely drawn conclusions. He will have little difficulty in understanding why the manufacturers should be so highly and loudly enthusiastic about the matter. Most of their wildest claims seem to them to be proved by medical experimentation, and they are not to be blamed because most of this so called "proof" fails to be real proof. One has only to talk for a few moments with them to be convinced that they are sincere in the belief that they are doing medicine a great service by making for it "the last word in infection."

Unquestionably, the world owes much to these gentlemen for the great service they have done. Just as unquestionably, the medical profession owes them the real, scientific investigation that will delete from their sales talk the gross exaggerations that now adorn it. Particularly is this true regarding the use of heat to the subvesical structures and their infections. Few will raise a voice against some of these claims but one would be gullible, indeed, to accept them all.

We might start by admitting that there is no doubt of the value of moderate degrees of heat upon prostatic congestions and acute prostatic infections. This is a matter so easy to prove that it cannot be denied. The doubt comes in when we are told that this heat when raised to certain heights cures by killing the bacteria causing the infection.

Let us see what laboratory experiences have taught us about the thermal death point of the bacteria concerned in such infections. From a bacteriologic standpoint, thermal death points are based upon bacteria in test-tubes and have to do only with fixed temperature readings. In the tissues with their constant thermoregulators, the tissue fluids and blood, we find no such ideal conditions for death point determination and it is admitted by all that we have no definite statements of tissue thermal death points. If we even thought that they were the same as test tube death points we should find very little justification for the idea that tissue heat could be raised sufficiently by local measures to kill the bacteria in question.

Perhaps, the wildest claims in this regard have been made of gonococcal infection of the prostate. The thermal death point of the gonococcus is probably above  $114^{\circ}\text{F}$ , for the gonococcus in the test tube will survive at  $113^{\circ}\text{F}$  for thirty minutes. Turning to clinical experience, the writer repeatedly has found the gonococcus in the prostatic secretion of individuals who had had prolonged courses of prostatic diathermy, seemingly properly

used as to endurable heat and duration of treatment. He has no hesitancy in saying that rectal heat, no matter how well applied, does not kill prostatic gonococci.

In postgonorrheal and focal infective prostatitis we largely are dealing with the staphylococcus or streptococcus. One who has made many staphylococcal vaccines knows that, if he would kill them by heat, he cannot depend upon temperature of lower than 57° C. (134.6° F.) for less than an hour. As a matter of fact, a temperature of 60° C. (140° F.) is the one most commonly used and even this is so problematical that one must prove bacterial death by culture efforts before he dare inject the vaccine. Colon bacillus prostatitis is by no means common but, where it does exist, no exception may be made of it.

With such thermal death-points before us it is not really necessary to turn to the clinical side. However, the writer has studied a large number of patients who had been given prostatic diathermy for such prostatic infections. He has yet to find one who was cured thereby and holds the fixed opinion that, aside, perhaps, from reducing subjective symptoms and swelling of the gland, the efforts were just that much time and money wasted.

Brought to its proper position, then, we are safe in believing that the application of heat to the prostate gland does reduce inflammatory and congestive swelling; it thus reduces subjective symptoms, and seemingly it does prevent some acutely infected glands from going on to abscess formation. This latter is not susceptible to real proof, however, as most acutely inflamed prostates would escape abscess formation anyway. Abscesses are decidedly rare in prostates that have not been subjected to direct trauma while acutely infected.

Further, there is little to suggest that the supposedly higher temperatures obtained by diathermy are any more efficacious than those that may be applied by the far less expensive rectal lavage or psychrophore. Indeed, there is much experimental reason to believe that so-called prostatic diathermy is really perithermy and that the gland temperature is not greatly elevated. Hence, as far as the subvesical structures are concerned, there is no need for the physician to feel that he is neglecting his patient merely because he does not own a diathermy apparatus.

No matter by what means heat is applied to these structures, there is need for much care in its use. The very types of inflammation for which heat is indicated almost invariably are associated with swelling of the structures to which the heat is to be applied. Such swelling causes a change in anatomic contour which makes the introduction into the rectum of solid bodies of the shapes that generally are used for such heat treatments none too easy or safe a procedure. Trauma to the lesion indicating heat is far too common and, if one views the assortment of instruments used in the light of changed structural arrangement, he readily will understand why such should be the case.

Most of the instruments used for this purpose are shaped to conform with normal anatomic arrangement. They either are straight or slightly curved and, while they safely can be used where they are not highly indicated, they do not lend themselves to safe introduction into the rectum, the front wall of which is markedly pushed backward by prostatic swelling.



When one inserts his finger into such a rectum the tip of the finger immediately is stopped by the prostatic swelling and, if he would obtain a true impression of the size of such a prostate, he must rotate the finger so that the palmar surface is against the posterior rectal wall. In other words, he must flex the finger into the hollow of the sacrum and palpate the subvesical structures with the dorsal surface of it (Figs 135, 136). He

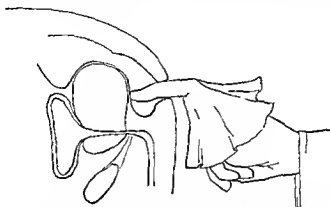


Fig 135—Digital palpation of the acutely swollen prostate gland

cannot pass his finger up into the rectum otherwise without producing dangerous pressure upon the greatly swollen gland. Prostatic abscess and epididymitis readily can be precipitated by such disregard of the changed direction of the rectal lumen. This can be readily understood by a study of the changed anatomy and the instruments used for such purposes

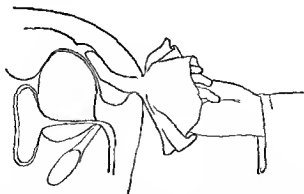


Fig 136—In order to estimate the size of a greatly swollen prostate gland, it often is necessary to turn the intrarectal finger toward the hollow of the sacrum and palpate the gland with the dorsal surface

It, therefore, is obvious that one's first consideration in the rectal application of heat to the swollen prostate and vesicles should be the shape of the applicator in relation to the *changed direction of the rectal canal*. The writer recalls two cases of epididymitis he precipitated by trying to use the Bransford Lewis prostatic heater. He has seen a number that were precipitated by others with instruments no more appropriately shaped, and he has

seen one prostatic abscess that unquestionably was due to such trauma. It is not necessary for the physician to be rough to cause trouble in this way. At best, he is carrying out a blind procedure when he introduces any instrument but the finger into the rectum. The grasp of the anal sphincter on the shaft of the instrument absolutely prevents his tactile sense from telling him just what he is doing with the tip of it. It can be said with confidence that no instrument that must pass far into the rectum of a person with a swollen infected prostate or seminal vesicles is a safe instrument—certainly no rigid instrument. Most certainly, the patient is not sufficiently skilled to use one without danger of further complications directly due to the trauma of it.

The most usual means employed for the application of rectal heat are by fluids passed into the rectum, fluids passed through a hollow instrument that has no opening into the rectum (psychrophote), by means of an electrically heated instrument or medical diathermy.

Hot rectal lavages are the safest means of applying heat to the subvesical structures in the presence of marked infective swellings. They can be carried out by means of a soft two-way catheter or, more, safely, by

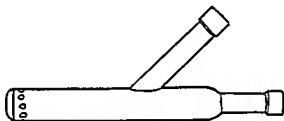


Fig. 137.—The author's modification of the Boyd rectal irrigator. (Made by the C. R. Bard Co.)

a two-way irrigating nozzle that need pass no further into the canal than just beyond the internal anal sphincter. Their only drawback is the possibility of irritation of the rectal mucous membrane. They may be carried out by any intelligent patient who is properly instructed. The water temperature should be from  $110^{\circ}$  to  $112^{\circ}$  F. and a lavage should be continued for from fifteen to thirty minutes. *This should be done from one to three or four times in the twenty-four hours, depending upon the severity of the condition for which they are used.* The addition of a teaspoonful of table salt to the quart of water does much to avoid rectal irritation. (Fig. 138.)

Rectal psychrophores are hollow instruments of differing shapes through which water circulates without escaping into the rectum. They make a very convenient means for the application of heat in cases where their rigidity is not a source of danger. The Eisner psychrophore is perhaps better shaped than any of the others (Fig. 139). In the presence of moderate prostatic swelling its concave curvature can be turned posteriorly so that the tip points toward the hollow of the sacrum and is less likely to traumatize the subvesical structures. The anal margin is far more sensitive to heat sensations than is the rectal wall, and the placing of a piece of

rubber tubing over that portion of the instrument directly in contact with the anal canal adds much to the comfort of the procedure

Electric prostatic heaters are insulated instruments containing a unit of resistance to the electric current. They usually have a rheostat for the control of the amount of heat and are arranged for attachment to the regular

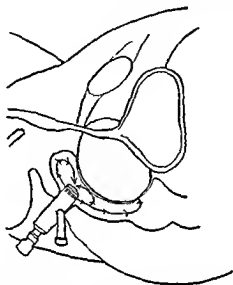


Fig 138—Rectal lavage with the author's modification of the Boyd rectal irrigator. Note that it does not extend far enough into the rectum to traumatize a swollen prostate gland

house current of electricity. The convenience of them is far in advance of any other method of heat application to these structures. The best known of these is that devised by Dr Bransford Lewis. Its shape, unfortunately, is an atrocity for the individual with a markedly swollen prostate gland. This limits its field of usefulness to those individuals for whom



Fig 139—Eisner rectal psychrophore for the application of heat or cold to the prostate gland. A tube from the fountain is attached to the upper channel. From it a small tube runs to the tip of the instrument which allows the fluid to flow through the instrument from within outward. By attaching a tube to the lower channel and placing its end in a vessel at the bedside the patient can give his treatments lying in bed. In the presence of marked prostatic swelling it often is best to turn the instrument so that its tip points toward the hollow of the sacrum

it is least needed. The misfortune largely could be overcome by a short, curved instrument with the heat unit on its convexity. Where it safely can be used, it makes the most ideal means for heat applications by the patient or the physician.

Medical diathermy to the subvesical structures is carried out by the insertion of an electrode into the rectum and the placing of an indifferent

pad or electrode over the suprapubic region. There are several types of rectal electrodes in some of which an effort has been made to respect the altered rectal curve in the presence of acute swellings of the prostate. The bipolar high-frequency electric current is used and, with efficient electric apparatus, tissue temperature can be raised slightly and maintained at a constant level. As has been said, there is much experimental evidence to support the belief that prostatic temperature is increased very little. One commonly gets perithermy instead of diathermy. The method has its virtues and its drawbacks and, like all things of the kind, it has a tendency to produce an enthusiasm which it in no sense merits. It has been credited with all sorts of impossible things.

Though one safely may make these pronouncements about the direct killing of bacteria, he must make a reservation regarding animal parasites, for they seem to be killed quickly by diathermy. Particularly is this true of *Trichomonas vaginalis* infestation of the prostate, for after a few such treatments they no longer can be found in the prostatic secretion.

#### SCROTAL SUPPORT AND PRESSURE

The application of some supporting dressing to the scrotum often becomes a matter of considerable importance in the treatment of conditions involving the scrotal contents. And it not infrequently happens that one

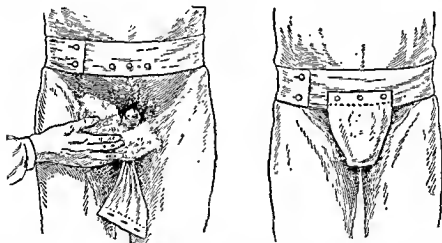


Fig. 140.—In the use of the jock-strap the scrotal contents are pushed forward on a nest of cotton and the anterior flap is drawn over them. The waist band is pulled well up so as to exert support and pressure. Both are best obtained with a smaller size than would be used ordinarily for the individual in question.

needs not only support but pressure. It, therefore, is important that the physician be familiar with the various means whereby either or both of these may be carried out with the least discomfort to the patient. For the mere matter of support one has only to resort to one of the many types of suspensories on the market, avoiding the patient's tendency to get one so large that it does not afford true support.

In the presence of acute inflammations of these structures it often becomes desirable to add pressure as well as support. There are many ways in which this may be carried out. Perhaps, the simplest means for this

purpose is the use of a heavy, woven jock-strap. If much pressure is required, a smaller size than ordinarily would be used for the given patient is chosen, and it often may be wise to increase the pressure this gives by a

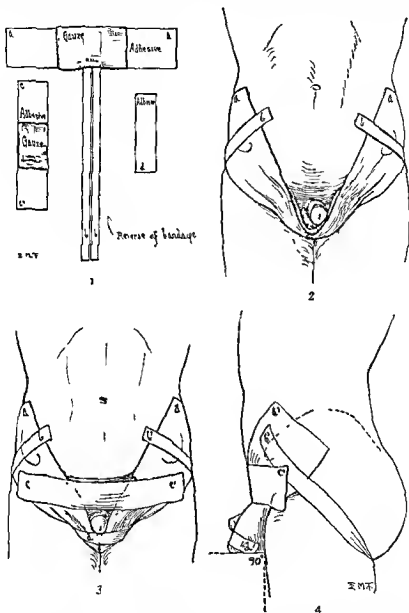
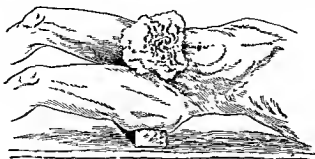


Fig 141—Adhesive dressing for scrotal support and pressure. For the application of this dressing the "Ace adhesive bandage" is preferable to regular adhesive plaster.

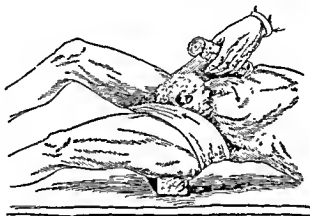
1 *a*, The suspensory, *b*, perineal strap, *c*, the suprapubic strap. 2 *a*, Crosses at the anterior superior spine. 3 Straps *c* and *d* complete the bandage. 4 Side view of the completed bandage. (Keyes, "Urology," D Appleton-Century Co., Publishers.)

thick nest of cotton. If one desires even greater pressure it can be obtained by passing a suspender or garter rubber from the waist band of the jock-strap up over the shoulders to give a constant upward pull to it.

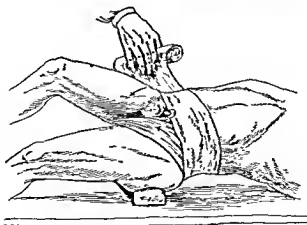
The bandage advised by Keyes (Fig. 141) is equally useful for the patient whose skin will stand adhesive plaster. In some individuals the



A



B



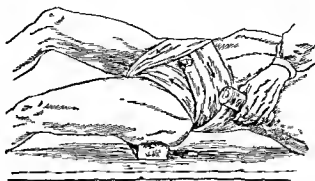
C

Fig. 142.

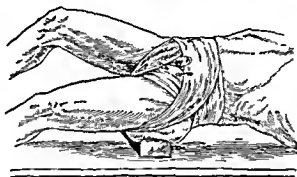
itching is so intense that the dressing has to be removed. The flexible Ace adhesive bandage serves well for this purpose.

The double spica bandage illustrated in figures 142 and 143 often proves

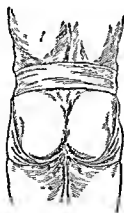
invaluable Its great drawbacks are that it does not minister to efforts toward cleanliness and there is often much itching of the unbathed sur-



D



E



F

Fig 143

Figs 142, 143.—*A-F*, To apply the Blockley bandage (a 6 inch muslin bandage is used) a block or several books are placed on a table to raise the buttocks. The scrotal contents are covered with a thick layer of absorbent cotton and pulled well upward toward the pubis. The various turns of the bandage are shown in *B*, *C*, and *D*. In *E* and *F* are shown the front and rear views of the completed bandage.

faces. The Ace elastic bandage about 5 inches wide makes a much more comfortable dressing than the 6 inch muslin bandage formerly used.

## SURFACE FULGURATION

What the urologist calls fulguration parades under a confusing assortment of names. To some it is known as "electric desiccation," to others, "high-frequency electric destruction," and to others it is "surgical diathermy." In the urologic office it has a number of uses and is applied either by means of the unipolar (Oudin) or bipolar (d'Arsonval) current. In the former method it is used by direct sparking from a metal point and in the latter the same procedure is carried out except that a broad indifferent electrode is placed upon some other portion of the body.

The Oudin current usually is employed for the destruction of lesions on the skin surface. For destruction through the cystoscope this current shows a greater tendency to break through the insulation of the instrument. The d'Arsonval current, on the other hand, does not do this to so great an extent and, for this reason, lends itself more readily to intravesical use.

The application of this form of electric destruction to the skin surface is most painful and, if a lesion of any size is to be destroyed with it, some form of local anesthesia should be used. Its chief surface use in urology is

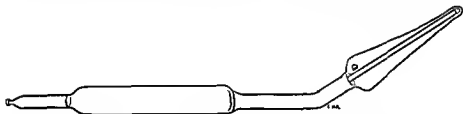


Fig. 144.—Best type of "vacuum" electrode for the high frequency electric treatment of chancroids.

in the destruction of the so-called venereal warts in the male, and of urethral caruncles in the female. It likewise is used in the Robbins and Seabury method of treating chancroids as described under that subject. If a bare metal point is used anesthesia must be complete. The same result may be obtained by passing the electricity into the chancroid from a pointed vacuum electrode. Carried out in this way, it is relatively painless.

Fulguration finds its greatest field of usefulness in the realm of cystoscopy, under which section it is further discussed.

## PROSTATIC MASSAGE

According to the dictionary, the word massage means a "therapeutic friction, stroking and kneading." There is reason to believe that in the medical mind, insofar as the prostate gland is concerned, it has grown to mean mostly the last of the three. Often, the kneading has been of so strenuous a sort as to do more harm than good and we, perhaps, should do much for urology if we abandoned the word massage and substituted for it "stroking."

Few, if any, therapeutic procedures in office urology have so wide a range of usefulness as has digital stroking of the prostate gland. As a point of focal infection, prostatitis in relation to the various systemic manifesta-



tions due to toxic absorption has assumed great importance and it has become apparent that a new view of such prostatic manipulations is in order. We no longer should plunge blindly along in our treatment of this gland as has been the custom heretofore. The damage that may follow such procedures is far too great to be viewed lightly. Particularly is this true of lesions of the heart and eye in which the prostatic infection plays a causal part, and in almost as great a measure does it apply to arthritis of like cause. It is as the result of these possibilities for harm that there is urged upon us a revision of our former ideas regarding prostatic infections and their treatment. Though these have been discussed in the chapter on *Focal Infective Prostatitis* they are so highly important that some of them will bear repeating here.

The most important use of prostatic massage rests in its unquestioned value in the treatment of infections of the gland. It is here that the focal infective field has forced a change of views from the ones so generally held regarding the way in which massage accomplishes its good. Our former ideas included four aims: drainage, quickening of circulation in the gland, stimulation of the gland musculature, and encouragement of resistance to infection. While none of these need be abandoned, it is necessary to add much to the last. For the term resistance to infection only partly explains the several things that are at play, not that we sufficiently understand the minute factors to stop hiding our ignorance behind a lot of high sounding words. We shall have to know far more about biochemistry, particularly that of infective processes and the things that combat them, before we can drop the words resistance, immunity and the like. There is, however, a field in which we do seem to have a glimmering of minute knowledge so far as direct clinical results are concerned—the field of protein sensitization. And it is in the various phenomena resulting from such sensitizations that we find the most understandable way to trace the association between focal infections and the distant manifestations of them. Unquestionably there is more to the problem than just this.

Let us then, for purposes of illustration, assume that a person develops an arthritis, neuritis, myocarditis, iritis or other condition (in the absence of actual bacterial infection of these several structures) because these tissues are highly sensitized to the toxins absorbed from some distant focus of infection. Under such conditions we have facing us the need for the desensitization of these tissues as well as the cure of the infection. If we can quickly remove the infection by the extraction of teeth or by tonsillectomy, we may avoid the necessity for desensitization.

Where infections are not so quickly eradicable we must concentrate on the former just as much as on the latter. And the more delicate the structure involved the more respect must we pay to its threshold of toxin tolerance. Particularly is this true as is elsewhere pointed out, of the heart and the eye, both of which may be damaged irreparably by any procedure that forces into the system a larger dose of the offending toxin than the tissues can stand.

Desensitization to foreign proteins is obtained by starting with minute doses of the given protein and gradually increasing their size. Sensitization is increased by reversing this process. And it is because of this that one

must think of prostatic massage in focal infective conditions more from the standpoint of toxin dosage than from that of prostatic drainage. The distant reactions following disregard of this often are of the utmost harm to the patient. Indeed, they even may be fatal in their outcome.

Aside from the question of the desensitization of distant areas resulting from prostatic massage, it is probable that the antigenic substances forced into the system also offer some encouragement to true antibody formation against the infection. This virtual autovaccination is, in a measure, analogous to the effects at times secured by the injection of vaccines. Certainly, we sometimes get reactions following prostatic massage that differ in no way from the reactions occasioned by the injection of too large a dose of vaccine. This, again, urges the viewing of prostatic massage from the standpoint of toxin threshold and grading one's pressure so as not to force into the system larger doses than it can stand without undue reaction.

Thus, we see that we must take an entirely different view of prostatic massage for the relief of distant focal infective manifestations than we have been accustomed to hold for the same procedure in uncomplicated prostatic infections wherein there is no distant sensitization to the bacterial toxin. In the former we must exercise control to the end that we avoid distant exacerbations of symptoms and, in the latter, no such care need be entertained. Even here, however, the question of local reaction in the prostate itself is of much importance and the treatment of every prostate should be started with a gentleness that can cause no local damage and the pressure increased at later treatments only as conditions warrant.

Before going into a description of the technic of prostatic massage, it is of the utmost value that the contraindications to the procedure be carefully considered. There are many prostate glands that should not be subjected to massage, and failure to recognize them has proved disastrous to many patients. Not a few tuberculous and carcinomatous prostates are subjected to massage. One could not imagine worse treatment for such conditions. The writer has seen a number of patients with the former who have been subjected to massage, some of whom died of acute miliary tuberculosis, while more developed massive genital, pulmonary or renal involvement. He has seen several patients with prostatic carcinoma subjected to the same treatment with extremely sad results. So commonly do these prostates receive massage as to give untold value to a rule to the effect that *no prostate containing a nodule of any type should be subjected to massage until it positively is proved the nodule is neither tuberculous nor carcinomatous.*

A rule equally important would be that, *no gonorrheal prostate should be subjected to massage until at least four weeks after the onset of the posterior infection and, even then, it should be confined to the slightest pressure on the gland for the first three treatments.*

In regard also to the prostatic infection causing distant symptoms, one might lay down several important rules.

*The prostate should not be massaged during the acute stage of any eye, heart or joint lesion. When instituted in the subsiding stages, it should not be repeated within three days of the subsidence of any distant reaction it has caused, and it should be discontinued in any patient who is growing*

worse as the result of it. In the latter it should not be resorted to again until the distant symptoms have reached a quiescent stage, and it should be stopped if it markedly reactivates them.

The greatest care should be exercised in massaging the small irregular prostates so commonly found in those individuals having massive joint changes, for the reactions following the procedure in such patients usually are severe and prolonged.

Diagnostic massage in the presence of any eye lesion should be of the gentlest sort. If the eye condition has any association with the prostate, a very slight prostatic pressure invariably will cause an increase in the eye symptoms. Such an increase in symptoms establishes the association with the prostate and the fact that it is infected. It usually is better to rely upon this reaction for an answer than to massage the gland strenuously enough to obtain its secretion for microscopic study. One never knows how severe an eye reaction may follow his first prostatic study, for which reason it should be confined to the gentlest of manipulations.

Massage of the hypertrophied prostate may be demanded by focal infective symptoms. If so it should be carried out with caution. Many such patients have marked varicosities at the vesical outlet and dangerous bleeding can be caused by massage of even moderate pressure. Bleeding may at times be avoided in such individuals by confining one's efforts to the lateral lobes of the gland and the avoidance of midline pressure. One need not be alarmed in these and other patients by a slight blood staining of the prostatic secretion, for it is not uncommon to occasion a slight capillary oozing at the first few treatments in patients with marked urethral congestions.

**The Technic of Prostatic Massage**—The prostate gland can be massaged with the patient in any position that makes it possible for the physician to place his finger on the gland. However, it is more convenient for both physician and patient to have the latter in a virtual leap frog position wherever this is possible. If difficulty is experienced in reaching the upper extremity of the gland or the seminal vesicular region, the crouching or knee chest positions are better. These positions thin out the perineum and make it possible to reach much higher into the pelvis.

As it has been described in the section on Rectal Palpation a rubber glove or the more convenient finger cot with a cape (Fig. 145) is worn to protect the hand. This is generously lubricated with some water soluble lubricant. Vaseline is too hard to remove from both the patient and the protective rubber. The finger is slowly passed through the anal sphincter to avoid pain and spasm. Because of direction of the canal, it is more comfortable to the patient if the finger is inserted palmar side up and rotated after it is in the rectum. After a preliminary palpation of the subvesical structures to make sure there are no local contraindications to massage, one is ready to begin.

In carrying out a diagnostic stroking of the gland, as well as in one's later massages for treatment purposes, certain things should be borne in mind. Viewed from the rectal side, the prostate presents a midline groove which overlies the sensitive portion of the gland. In fact, most of the real discomfort or pain of massage is due to pressure on this area, although the

left lobe usually is much more sensitive than the right. Many patients complain of discomfort on the left when the right lobe is being massaged. They rarely, if ever, refer the discomfort of left-sided pressure to the right side of the gland.

Because of this greater midline and left-sided sensitiveness it is a good plan to start with the least sensitive regions first, leaving the worst until last. The writer's custom is to pass the finger to the upper pole of the right lobe of the prostate and bring it down parallel with the urethra to the perineum. Great care is taken not to let the finger pass in toward the midline as it is brought down. This stroke is made by pushing the knuckles

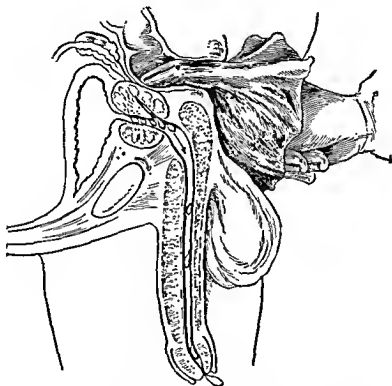


Fig. 145.—Method of obtaining the prostatic fluid for microscopic study. Note the single glove finger, with the cape for the protection of the hand. (After Legueu and Papin.)

firmly into the perineum and bending the index finger. This avoids the anal discomfort and, often, injury that accompanies massage given by working the proximal portion of the finger backward and forward through the sphincter. When several of these longitudinal strokes have been made over the right lobe, the same thing is done to the left lobe. After this, the finger is brought from above downward in the midline one or more times, and it usually will be found that some of the glandular secretion appears at the urinary meatus in those patients in whom sufficient pressure is safe. If it is desired to obtain the seminal vesicular secretion, the finger is passed upward and outward above the prostate and brought downward and inward toward the midline one or more times (Figs. 146, 147).

One never should allow himself to become routine in the carrying out of prostatic massage. He constantly should keep his mind on the tip of the finger in the rectum. In no other way can he regulate the finger pressure to suit the needs of safety for each individual case. As has been pointed out, the proper amount of pressure that safely can be applied to a given prostate without greatly harming the patient is the most important consideration in the entire subject. Unfortunately, one cannot always be guided in this respect by the patient's manifestations of pain, for the more apprehensive he is, the greater will be the demonstration he makes on the first massage. On later massages this, however, rarely holds, although one

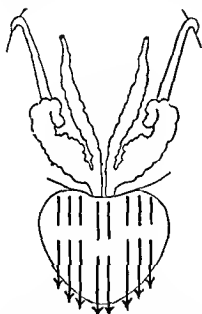


Fig 146—Direction of the stroking of the prostate gland. By leaving the midline strokes until last the discomfort is reduced to a minimum and is at the end of the treatment.

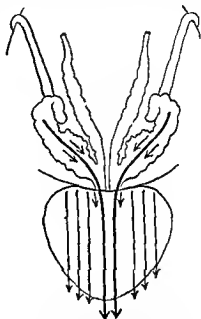


Fig 147 Prostatic massage and stripping of the seminal vesicles.

rather safely may say that massage that causes great pain is too strenuous for that patient.

The intervals at which massage should be repeated is a matter of the utmost curative importance. In focal infective prostatitis associated with distant lesions of a painful or dangerous nature, one must be guided first by the patient's distant reactions to the treatment. In such patients, as has been said, the most important rule is that massage should not be repeated within three days of the entire subsidence of any reaction, local or remote, that it has precipitated.

In prostatic infection of any type it is a simple matter to prove that one rarely, if ever, can cause the infection to disappear by treatments spaced a week apart. At the other extreme, it is an equally simple matter to prove microscopically that treatments given on alternate days treat

do more harm than good. Under such spacing there quickly appear in the expressed secretion large numbers of red blood cells and, frequently, the gland increases greatly in size. No such result follows properly given massage at three or four days' intervals and, in the absence of tonsillar or dental infections or some local pathology preventing improvement, they usually go on to cure. If they do not improve within six weeks of two massages a week, one should think more in terms of distant causal infections than of the gland itself. This applies with considerable force, even in the gonorrheal prostate.

Under the headings of Prostatic Secretion and Prostatitis these matters are further discussed.

#### MASSAGE OF COWPER'S GLANDS

While the normal Cowper's gland cannot be palpated, the abnormal or infected gland almost always can be discovered by rectoperineal palpation. Though gonococcal infections of Cowper's gland usually form abscesses which have to be evacuated through the perineum, it should not be forgotten that the gland occasionally holds a chronic infection and that this may serve as a prolonged gonococcal feeder for the anterior urethra. It is well to bear this in mind in those cases that have prolonged gonorrheal discharge, though the infection has never gone into the posterior urethra, as well as in those patients who continue to have gonococci and a scanty urethral discharge after the prostate gland has been rendered free from pus following gonorrhea.

The position of the patient for palpation of Cowper's gland is the same as that for prostatic massage. It should be remembered that Cowper's glands are rather superficially placed in the perineum between the two layers of the triangular ligament, one on each side of the membranous urethra. The method of palpating them is, as has been described elsewhere, to place the finger in the rectum and carry it just to the side of the apex of the prostate. It will be found in this area that the finger drops into the triangular space below the pubic arch and lateral to the membranous urethra. With the thumb in the perineum just to one side of the bulb, the inflamed gland or the induration around it readily can be palpated by kneading the intervening tissues between the thumb and forefinger. (See Fig. 97.) At times, one only can make out the fact that one side of the perineum is much thicker than the other, but, after a short course of gentle digital treatment of the tissues between the thumb and forefinger, the induration gradually subsides and he easily can outline the contour of the inflamed gland, which usually is about 0.50 to 0.75 cm. in diameter.

Massage of Cowper's glands should be carried out at the same intervals used for prostatic massage, two times a week. Usually, gonococcal infections of the gland can be cleared up by this means, but, if cure does not take place, the removal of an infected Cowper's gland is a very simple surgical procedure. It merely requires that one place the finger over the Cowper's gland within the rectum and push it firmly out into the perineum where it readily can be made to appear into a small transverse incision. The writer has only had to have this done to two patients, but on both occasions the surgeon remarked upon the ease with which it was accomplished.

## PROLONGED HYPERTHERMIA

While this mode of treatment is in no sense an office procedure, it does have a very definite place in the treatment of urologic cases. Its dangers are such as limit its application to those patients whose disease complications are of a decidedly serious character.

Those who have used it most and with, perhaps, the greatest care, Carpenter and Warren, express the belief that it should not be used in gonorrhea that can be cured by other and safer methods. Thus, as a routine treatment for gonorrhea it is far more dangerous than the disease itself. In this disease it finds its main use in the treatment of arthritic involvement and, for this complication, it usually gives prompt relief. It has been lauded for such conditions as gonococcal septicemia, ophthalmia, and in the pelvic complications of the female.

## INTERNAL MEDICAMENTS USED IN UROLOGIC PRACTICE

Urologic patients, being just human beings whose ills have seen fit to select the urogenital system, are subject to the same general therapeutic rules that apply to other patients. There are, however, a number of substances that are in more or less common use for the treatment of maladies thus located. And it is here proposed to list those of apparently proven value, to discuss their indications and contraindications and to outline their dosages and general means of administration. In doing this there is little point in including that vast assortment of drugs that have enjoyed their little day in the sun, usually because of their greater advertising, and have gone or should go into that great void of things forgotten. For far too long a period of time many of them have been included in our lists of supposedly useful things. Many of them stand as rather shining monuments to medical credulity.

The present effort to turn the medical mind toward pharmacopoeial preparations is a highly laudable one. The extent to which we have been lured away from these by high sounding commercial advertisements often has shown us somewhat lacking in a sense of real values. Frequently, there is little or no difference between these highly vaunted proprietary preparations and those listed in the pharmacopoeia beyond their copyrighted names and far greater cost. Not uncommonly, their use has added greatly to the financial burdens of the sick—and to no great good purpose. Therefore, in the present discussion pharmacopoeial preparations alone will be considered wherever such a limitation is possible.

**Sedatives, Analgesics and Hypnotics**—So far as urologic patients are concerned it is not always wise to divide the pharmacopoeia up into those drugs which quiet the nervous system, those which relieve pain and those which relieve pain and also induce sleep. A large percentage of those who have or think they have some urogenital malady develop an assortment of psychogenic symptoms that are likely to be interpreted into pain instead of just discomfort. Indeed, except in those true pathologic conditions associated with real local pain, one often can relieve the patient's pain and put him to sleep by the administration of drugs not in themselves true pain relievers or hypnotics. Often, the "pain" can be relieved and the nervous system sedated by the mere banishment of the patient's fears. In

other words, one can do just as well in many cases by quieting the patient's anxiety and, perhaps, giving him a little sodium bromide. Even the more severe grades of pain frequently are rendered far more bearable simply by letting the patient know what it is all about. Also, if true hypnotics are needed, a smaller dose will give a response equal to almost twice the amount in the presence of great fright.

*Sodium Bromide.*—This bromine salt, being the least objectionable in taste and, perhaps, the least irritating to the stomach, has been widely used in urology for the sedation of highly nervous patients. In moderate dosage it acts as a mild depressant to the brain, while in larger doses it has a like action upon the spinal cord and, to some extent, upon the peripheral sensory nerve endings. Thus, it reduces mental activity so that, although the patient is conscious of all that goes on around him, he is far less annoyed by things that ordinarily disturb him. In other words, he is in a semi-apathetic state. Sleep often is more easily obtained, though it is seldom deep. The effect of sodium bromide is exactly the opposite of that of strychnine in that it dulls reflex action. This it does to a marked degree with those of the urogenital tract.

The bromides, as a group, are very rapidly absorbed but slowly eliminated. It thus has been shown that, after even a single dose, bromine often can be found in the urine for as long as twenty days or more. Upon continued dosage the elimination rate increases, so that after a medication period of two or three weeks it may equal the rate of administration. Despite this unusual phenomenon, cumulative effects are by no means rare.

Sodium bromide may be given in doses of from 5 to 30 grains in tablet form or with a liquid adjuvant. If large doses are given they should be widely spaced and reduced or discontinued on the appearance of toxic symptoms such as continued drowsiness, general indifference, partial insensibility of the skin, unsteady gait, digestive disturbances, stupid facial expression, or skin eruptions.

This drug lends itself to many uses in urologic practice, which range from a mild sedative for the slightly nervous patient to a truly hypnotic (?) influence in the apprehensive patient if it is given with a fair amount of convincing chatter. In this latter class of patients one easily can convince himself of the value of such "chatter" by observing how frequently some drug that is in no sense sedative will give "great relief." Even aromatic spirits of ammonia "will put" some of them into a comfortable sleep. To the patient with local discomfort or even slight pain, not psychogenic in origin, sodium bromide often is of great benefit.

*Acetylsalicylic Acid (Acid. Acetylsal., U.S.P.).*—This salicylic acid combination largely has replaced sodium salicylate by virtue of its better taste, less irritating action on the stomach and its greater pain relieving qualities. It should not be forgotten that it is a salicylic acid derivative which, in a few patients, may cause rather distressing untoward symptoms due to an apparent idiosyncrasy. By most individuals it is well borne and by its use it commonly is possible to avoid resort to opiates. It relieves the muscle ache of fatigue, as well as the lesser grades of local pain. Given in the dose of 10 grains upon retiring in the patient with nocturnal frequency of urination, it commonly reduces the frequency and assures a far more



restful night. Because of this sedative influence upon the bladder, acetylsalicylic acid has a distinct value where the patient is trying to overcome the habit of frequent urination. Given in doses of 5 grains after meals and 10 grains at bed time, it usually gives much relief to these patients as well as to many patients having mild grades of cystitis.

Where the patient is in considerable pain it is common practice to add either acetphenetidin (USP), 2 to 5 grains or aminopyrine (USP), 3 to 5 grains to the acetylsalicylic acid dose to avoid the necessity of resorting to opiates with their greater dangers of habit formation.

*Calcreose*—For the sedation of nerve ends in bladder irritations and inflammations nothing, short of opiates, has given the writer such happy results as has calcreose. This has been particularly so in the early days of acute gonorrheal urethrotigonitis. And it has been the means of greatly reducing the nocturnal discomfort and frequency of urination so common to obstructions at the vesical outlet and other conditions. Apparently it has little if any value as a urinary antiseptic but exerts its sedative action directly upon the bladder mucosa by virtue of its concentration in the urine.

Calcreose is nontoxic in even high dosage and, if administered properly, it rarely causes gastric distress or the unpleasant belching of creosote fumes. In some few patients it has a tendency to move the bowels and occasionally there is a slight diarrhea.

It is best given in the dosage of from two to four 4-grain tablets from one half to one hour after eating and at least four tablets upon retiring. It can be continued for long periods of time.

*Opiates*—He is a wise physician who avoids these substances wherever possible and a decidedly thoughtless one who tells the patient that he is taking morphine, if he is. However, there occur cases wherein resort to drugs of this group almost cannot be avoided.

*Camphorated Tincture of Opium (Paregoric)*—Many of our forefathers in urology used to insist that paregoric had a special affinity for the bladder. For that reason, it has been used widely to allay the minor degrees of vesical discomfort and to slightly sedate the general nervous system. It frequently is prescribed with an antispasmodic, such as belladonna or hyoscyamus where there is slight or marked vesical tenesmus. Given alone in dram doses upon retiring, it often assures the patient with nocturnal frequency of urination a far more restful night. Being, in a sense, a household remedy it lends itself to telephone prescribing in the middle of the night when sleep for the doctor may be as important as the relief of some ideogenic pain for the patient.

*Codeme and Morphine*—In those conditions requiring an opiate, it usually is better to resort to codeine than to morphine. There is less likelihood of habit formation with codeine and the larger possible dosage makes accidents due to dosage less important. Indeed, it is questionable if it ever is safe to place morphine in the patient's hands. It should be held for direct medication of the patient by his physician, even if it is to be given orally instead of hypodermatically. In the presence of excruciating pain, the latter method of administration should be resorted to, but at other times the oral administration of codeine is safer for the patient's own use. Given in doses ranging from  $\frac{1}{8}$  to 10 grain according to the severity of symptoms, it rarely produces any important side reactions and can be

continued for some length of time. In some patients it constipates as do most of the other drugs in this group.

*Opium Suppositories.*—For the relief of marked frequency of urination, great burning, tenesmus of the bladder and pain it is common to prescribe rectal suppositories. These usually consist of 1.0 grain of powdered opium in cocoa butter. If vesical tenesmus is a prominent symptom  $\frac{1}{8}$  to  $\frac{1}{4}$  grain of extract of belladonna is added to the suppository.

*Barbiturates.*—The various salts of barbituric acid are used for the production of sleep and often are of considerable use to the urologist. The pharmacopeial preparations are barbital (diethylbarbituric acid) and barbital soluble (sodium barbital), both of which are administered in dosages of from 2 to 5 grains.

The effect of a single dose of either of the above salts is quite prolonged and there is a tendency in many patients for continued after-reaction. For this reason the makers of many of the newer proprietary preparations have gone to great trouble to produce salts that are claimed to be completely excreted from the body in a shorter period than are the above two. The claim for most of them is that the patient awakens with a clear mind and no after-reaction. Obviously there are urologic patients in whom an after-drowsiness has greater advantage. Particularly is this so in bed patients who have had to be placed on constant bladder catheterization. Such patients gain much from the mental dullness of such a reaction and, usually, it is not necessary to repeat the dose as soon as might be needed with a salt giving little or no after-reaction.

To a large extent the after-reaction of barbital is dependent upon the amount administered. It can be reduced or increased solely by varying the quantity and, as one studies the recommended dosages of many of these newer proprietary salts of barbituric acid, he is likely to conclude that much of the clear-mindedness of which they speak is due mostly to the fact that the patient receives a smaller dose.

The barbiturates exert their influences almost entirely through depression of the psychic portions of the brain. They rarely exert this action within a half hour of their oral administration and the duration of the sleep thus induced varies with both the dose and the individual. Usually, the more nervous and excited the patient the lighter and shorter is the sleep produced.

*Antispasmodics.—Belladonna.*—The chief use of the belladonna in urology is as an antispasmodic. Its action in this regard is due to its depressant effect upon involuntary muscle tissue. In very small doses it exercises a slight effect in the opposite direction, probably through its inhibiting effect upon nerve endings. In full doses it does much to allay vesical spasm and irritability. Thus it is a common ingredient of prescriptions for the relief of urinary frequency due to vesical inflammation, as well as in suppositories in combination with opium in the presence of vesical pain associated with muscular spasm. In the treatment of many cases of enuresis in children it is highly beneficial and, as children are less susceptible to its toxic effects, proportionately larger doses of the drug are used in them. For these purposes some prefer hyoseyamus because it frequently is better borne in larger doses.

As a rule, little use is made of atropine in urologic practice because of its greater activity and the greater likelihood of toxic effects. The tincture of belladonna in from 5- to 20 minim doses is most commonly employed for oral medication, while for combination with opium in rectal suppositories the extract is used in from  $\frac{1}{8}$ - to  $\frac{1}{4}$  grain quantities.

*Hyoeyamus*—Used for the same purposes as is belladonna, hyoeyamus is much less likely to produce marked toxic effects, certainly in equal dosage. It is reputed to have a more profound depressant action on peripheral nerve ends. It is generally administered in the form of the tincture in doses of from 20 to 30 minims. As with belladonna, the patient should be watched for toxic effects, but in most respects it is far weaker in its action than is belladonna, as should be expected from its lower alkaloidal content.

**Urinary Acidifiers**—Our present plans for the treatment of many urinary infections require that the urine be rendered decidedly acid in reaction. This is particularly so where such drugs as mandelic acid or methenamine are being administered. It has been shown that the antiseptic value of the former is efficient only when the urinary reaction is more acid than a pH of 5.5. Such urinary acidification in patients with a normal urine is a simple thing to bring about with but slight changes in the diet. In the presence of certain urinary infections, particularly those due to urea-splitting organisms, it is not always such a simple matter and, upon rare occasions, it cannot be brought about by any of the usual means of urinary acidification. The most common drugs employed for this purpose are the following: Ammonium chloride 10 to 30 grains three times a day. Sodium biphosphate (sodium acid phosphare) 10 to 30 grains three times a day. Ammonium benzoate 5 to 15 grains three times a day.

Urinary acidification also may be brought about by the careful use of the mineral acids. Nitrohydrochloric acid has been most largely used about as follows:

|  |            |
|--|------------|
| ℞ Nitrohydrochloric acid (full strength) | 3 iv       |
| Water                                    | qs ad 3 iv |

Sig. A teaspoonful in a glass of water after meals

(Beckman warns against the taking of calomel while taking nitrohydrochloric acid because of the slight possibility of its being changed into mercuric chloride.)

**Urinary Alkalizers**—Though it most commonly is the physician's task to acidify the urine it at times becomes necessary for him to bring it to the alkaline side of neutrality. The swing in this direction is seldom so wide as that easily obtained, as a rule, on the acid side. Usually, it is not possible to bring the pH of the urine by such medication further to the alkaline side than 8.5. More often it stops at pH 7.5.

Aside from the alkaline ash diet, elsewhere described, or some less readily substitute for it, the substances most generally used for alkalization are the following: Sodium bicarbonate 15 to 60 grains, three times a day. Potassium acetate 15 to 60 grains, three times a day. Potassium citrate 15 to 60 grains, three times a day. Potassium citrate effervescent 60 to 120 grains in water while effervescing, three times a day.

In addition to these the fruit juices, lemon, lime, and orange are of service.

**Urinary Antiseptics.**—*Mandelic acid and its salts:* Under the heading of Urinary Antiseptics much has been said of the uses of mandelic acid. For this reason, it suffices to say in the present connection that the great difficulty in administering it has turned most urologists to the ammonium salt.

Ammonium mandelate also has the added quality of rendering the urine acid. It having been shown that the urine must be at a pH of 5.5 or less for the drug to exert its greatest bactericidal influence, it may be necessary at times to fortify it further by the concomitant administration of some ammonium chloride. The usual dose of ammonium mandelate is from 15 to 60 grains, three times a day. To avoid gastric distress most manufacturers supply these tablets with a so-called enteric coating.

*Methenamine.*—For many years this drug has been employed as a urinary antiseptic and there can be little doubt about its having great value if properly used. It is eliminated by the kidneys without change and is totally inert unless the urine is sufficiently acid and retained for a sufficient length of time for the gradual liberation of its contained formalin. While some change takes place in the acid gastric juices, most of the drug is absorbed from the stomach and excreted unchanged, often to as great an amount as 65 per cent of the administered dosage.

Its liberation of formalin requires a urinary pH of 5.5 or stronger and considerable time. Thus, the drug is useless in the presence of an alkaline urine and wherever the urine cannot be retained for considerable time. According to Bastedo, the urinary concentration of formaldehyde, under proper circumstances and medicinal dosage, ranges from 1:100,000 to 1:20,000. With the weaker concentrations it is obvious that its effect would be largely bacteriostatic rather than bactericidal. Indeed, this would be the case with most bacteria even at the higher concentrations. Efficient bacteriostasis is a matter of constant supply of formaldehyde and is a slow process in which other agencies must promote real cure. That these latter often do better if relieved of most of the bacteria present, as well as their rapid multiplication, is highly in evidence. From it we can draw the conclusion that he who discontinues his medication just as soon as the urine clears, should expect recurrences because of bacteria still present and a lagging of real curative responses because of the recurrence. At least, this is the way things commonly work out unless one continues methenamine administration for a week or two longer than the appearance of the urine would seem to demand.

In some few individuals methenamine may cause either or all of the following untoward reactions: gastric irritation, abdominal pain, diarrhea, irritation of the kidneys and bladder, headache, morbilliform rash, hematuria, and ringing of the ears.

The usual adult dose ranges from 5 to 10 grains, three times a day. If the urine is not acid it, as has been said, is useless, for which reason it is common custom to add to the dose either ammonium chloride (5 to 10 grains) or acid sodium phosphate (10 to 15 grains).

*Sulfanilamide.*—So much has been said about the uses of this drug and in so many places that it should be only necessary in the present connection to outline its dangers and to give the schemes of dosage in common use.

While sulfanilamide almost has been entirely replaced by sulfathiazole in urologic practice, we have far better data upon its possible toxic by-effects than upon either of its derivatives. For that reason, this phase of the subject is worthy of consideration if for no other than serving as an exhibition of the things for which one should watch in the use of any of the sulfonamides. There are patients who are prone, through individual idiosyncrasy, to develop like reactions to each of them. Early custom was to advise repeated blood counts upon all patients taking these drugs but with the lower doses being used in urologic practice this precaution largely has been abandoned.

**TOXIC REACTIONS**—So far as the toxic reactions of sulfanilamide are concerned the writer is going to exercise the privilege accorded him for his book entitled *Gonorrhea in the Male and Female*,<sup>1</sup> and will quote the list worked out by that most careful of clinicians, Dr. Thomas Fitz Hugh, Jr.

- 1 General Malaise, faintness, vertigo headache tinnitus and lassitude (Common but relatively trivial)
- 2 Central Nervous System Mental confusion and optic neuritis (Rare and apparently not productive of permanent damage if recognized in time)
- 3 Gastro intestinal Nausea, vomiting pyrosis anorexia and abdominal pain (Common and sometimes distressing, but not serious)
- 4 Hepatic Acute hepatitis with jaundice and cholemia (Rare but potentially serious)
- 5 Renal Transient hematuria and albuminuria (Rare and trivial but if combined with hepatitis and azotemia this may become serious)
- 6 Cardiac and Circulatory Shock, precordial pain anoxemia and fresh cardiac damage in predamaged hearts (Rare and thus far not serious)
- 7 Cyanotic Sometimes prompt sometimes delayed and progressive (Usually mild and common, rarely severe and serious)
- 8 Acidotic Not as a rule of clinical importance
- 9 Cutaneous Morbilliform, scarlatiniform, urticarial, vesicular and purpuric lesions (Variable and possibly increased by sun exposure fairly common and not serious—sometimes delayed)
- 10 Febrile Irregular but usually pyrexia after a week of treatment (Not very common and usually not serious except diagnostically)
- 11 Anemia Acute progressive hemolytic anemia (Rare but potentially serious) Also pancytopenic anemia (Rare and serious)
- 12 Leukopenic Delayed but rapidly developing agranulocytosis (Rare and serious)

**DOSAGE**—In ambulatory cases (adults) several dosage schemes are in common use. One, advised by Dees and Colston, employs 80 grains per day for two days, 60 grains per day for three more days and then a maintenance dose of 30 to 40 grains per day thereafter. Another popular scheme is to give 60 grains a day for three days and then a maintenance dose of from 30 to 40 grains thereafter. Some use 45 grains per day throughout the course of treatment while Van Slyke, Thayer and Mahoney used as high as 120 grains a day in robust bed patients. Since these preliminary investigations most physicians have turned to the newer and better sulfonamides. Especially in treating gonorrhea they insist sulfanilamide should never be used because of its low cure and high asymptomatic carrier rates.

Since the first work on sulfanilamide several sulfonamides have been investigated. Sulfanilic sulfanilamide (Disulon) and sulfamethathiazole failed

<sup>1</sup> Third Edition 1939, W. B. Saunders Company, Philadelphia

of endorsement since they tend to cause peripheral neuritis, but sulfapyridine and sulfathiazole were allowed to be placed upon the market.

**Sulfapyridine.**—A wealth of investigation has proved this drug to be of the utmost value. Its only drawback is its rather high toxicity rate which, dose for dose, is about equal to that of the parent drug, sulfanilamide. In urinary infections, and particularly in gonorrhea, this is not an insurmountable barrier to its use, however, as one does not aim at high blood concentration, as is the case with pneumonia and many other diseases. Not more than 25 gm. are used for a course of treatment and the medication period is short, not extending over more than nine days. Its use in urology has been largely supplanted by sulfathiazole.

**Sulfathiazole.**—In urologic circles this drug seems the answer to prayer. Its high cure rate, particularly in gonococcal infections, and its low toxicity rate make it the ideal one for ambulatory patients. Its particular value in the presence of staphylococci and most bacteria at play in urogenital maladies makes it the drug of choice of most clinicians. Its high cure rate and low asymptomatic carrier rate in gonorrhea place it upon a therapeutic plane that will not make it easy for later sulfonamides to displace it, if, indeed, any are found to compare favorably with it.

Though its toxicity rate is extremely low, one should not use sulfathiazole in utter disregard of its possible dangers. It is a sulfonamide and capable of producing in some few patients the same by-effects that previously have been described for sulfanilamide. Patients should be seen at most every seventy-two hours while taking it. It rarely produces toxic symptoms of a gravity to compel its discontinuance but, where they do occur, the drug should be abandoned at once and the patient's fluid intake greatly increased. One should bear in mind that in large doses where fluid intake is low this drug has caused marked crystalline deposits in the renal tubules and kidney pelvis, even to the extent of causing ureteral block and anuria. On the doses advised for urogenital infections in ambulatory cases, whose fluid intake is rarely in excess of 1000 cc. per day this almost never occurs. The danger in bed patients with renal embarrassment and low fluid intake, and particularly where ureteral drainage is impeded, may be very serious.

The treatment of gonorrhea with sulfathiazole is one of our greatest chemotherapeutic achievements. Its speed in removing the symptoms in at least 80 per cent of patients is little short of miraculous. Its only real drawback is the danger of the production of asymptomatic carrier states which, though they seemingly do not exceed 7 per cent of those treated, give grounds for much anxiety. This must be borne in mind regarding other infecting agents of the urogenital tract, and one should not be too sure that apparent disappearance of such bacteria is of necessity a permanent one. Such patients should be observed for some time after seeming cure.

The dosage of sulfathiazole in urogenital infections seldom need exceed 25 gm. or a medication period of not more than nine days. The section on the treatment of gonorrhea contains the schemes of dosage used by a number of investigators which gave in their hands about equal curative results.

**Sandalwood Oil (Oil of Santal; Oleum Santali, U.S.P.).**—Although this oil properly has lost most of its popularity as a treatment for gonorrhea,

it still is of use in some urologic conditions. In the presence of gonorrhea it often exerts a decidedly sedative influence upon the urethra and bladder mucosa, making the patient more comfortable and, often, either reducing or checking the formation of pus. There is little to suggest that this effect is a curative one, as the discharge almost invariably returns when the drug is discontinued and the gonococcus is still to be demonstrated. Indeed, unless one warns his patient of this, he is very likely to think cure has taken place and to transmit his infection to others. It is for this reason that the drug often serves as a social menace in misleading both the physician and the patient into a false belief in cure. If given during the course of gonorrhea it should be discontinued for at least a week before reliance is placed in the usual tests of cure.

The oil usually is dispensed in capsules containing 5 to 10 minims each, of which four are given in the twenty-four hours. It is better to give them from a half to one hour after meals and at bed time.

**Mecholyl (Acetyl beta methylcholine Chloride)**—Whether or not the initial difficulty of the so called spinal cord bladder is a loss of sensory perception in the bladder nerve ends is today a question still under discussion. There is little doubt however, of the difficulty in the passage of motor impulses to that viscus in the several diseases of the spinal cord that interfere with bladder function particularly in *tabes dorsalis*. And there has arisen a definite need for some drug to stimulate or increase the activity of the nervous tissue having to do with the emptying mechanism of the urinary bladder.

According to some investigators, and particularly Langworthy,<sup>1</sup> the choline product marketed under the trade name of mecholyl exercises such an action and, in some cases brings about much more forcible contraction of the detrusor muscles. While there are dissenting opinions, as is so with almost everything good or bad there is sufficient evidence of its value to warrant its trial in cases of such bladder dysfunction. Cases have been reported wherein it has been credited with the clearing up of large quantities of residual urine resulting from total loss of contractile power. Thus it would seem to be indicated in patients having any difficulty in urination that is directly due to faulty contraction of the bladder musculature.

Mecholyl is marketed as mecholyl bromide in tablets containing 0.2 gram for oral administration and as mecholyl chloride ampules containing 0.025 gram of the powder to be dissolved in physiologic salt solution for hypodermatic use.

Mecholyl bromide is recommended in quantities ranging from 200 to 300 mg. per day. It does not lend itself to parenteral uses.

Mecholyl chloride is suggested in the subcutaneous dose of from 20 to 25 mg. for prompt action.

Like all choline derivatives these are not without danger, and should be given to patients only under the close observation of the physician. Several deaths have been attributed to their use.

#### VACCINES

It would be difficult, if not impossible, to find in all the realms of science a more interesting and a more therapeutically indicative series of

<sup>1</sup> Langworthy, O. R. *Internat. Clin.*, 3: 98, 1936.

phenomena and theories than are those upon which our ideas of vaccines in the treatment of infections are based. The laboratory and animal demonstration of such things as agglutinins, precipitins, bacteriolysins, opsonins, antitoxins, antisera and like things has been such a remarkable chapter in the study of infections and the means whereby they are overcome that there is little wonder that millions of gallons of these antigenic substances have been used. Also, there is little wonder that, in the face of more disappointments than we can marshal against any other group of therapeutic agents, these substances have been used, thrown aside and re-used time after time for groups of diseases in which they have shown practically no power in the stimulation of immunity in the human body.

This is particularly so of infections of the urogenital system. And it is more particularly so of gonococcal infections. In this disease our vaccine experimentations often have been so lacking in reason that they have brought disaster to many patients. Despite the unsavory reputation that their repeated trials have given them, we have followed lead after lead just because things were presented in a different set of terms, though they were, in reality, the same old thing—the stimulation of immunity by the injection of a gonococcal toxin. In a lesser degree, the same is true of our uses of such products in other diseases of this system. Despite the repeated demonstration that they practically were devoid of value in most such infections, we have allowed theory to tempt us to try them again and again in all sorts of different ways, in the forlorn hope that the fault was ours and that, if we changed our methods, we must surely reap some of the benefits others insisted they obtained.

The writer went through about fifteen years of these oscillations until it finally became his firm conviction that he was wasting his patients' money and trying his soul with things that so rarely gave benefit that they largely were not worth the trial. His last experience in this regard was with focal infective prostatitis. Many years before, he had tried vaccines for this condition and abandoned them as of little or no value. Then, a physician who had referred him many patients asked that his patients be given an autogenous vaccine along with prostatic massage. For two years this was religiously done. After this time, the above referring physician ceased to ask that vaccines be given and they were discontinued. Three years after this the doctor, in order to correlate the findings upon his cases for a book he was writing, asked for the data upon all of the cases he had referred. When this was gotten together it revealed something that was a great surprise to even the writer. Not one of the patients who had received vaccine had had his prostatic secretion rendered pus-free. On the other hand, of the later patients who had been under treatment long enough almost all had a normal secretion and had been discharged. Though this vaccine experience did not cure the patients it most surely cured the one who had administered them.

It is said that vaccines, at times, are of value in pyelonephritis, particularly in children, cystitis and other urogenital infections, but the writer, from wealth of experience, is of the opinion that these beneficial actions must be rare, indeed. He is firmly of the conviction that a careful review of these supposedly benefited cases would show that improvement far



more appropriately should be attributed to other things, particularly to the natural or artificial establishment of better drainage and an improvement in general health as the result of things other than artificial antibody stimulation

Assuredly, if one feels that he should use vaccines he should do so with due regard to their dangers and an equal regard for the time in which they have their best, though meager, chance of doing some good. In acute infections of this tract they may be a distinct menace—a fact that is more particularly true of gonorrhea than of any of the others except, perhaps, acute pyelonephritis. He might find his hand stayed somewhat if he keeps in mind the following statement from Stitt, Clough and Clough<sup>1</sup>: "For the most part vaccines are not indicated in acute infections." It is probable, if he avoids their uses in the early stages of urogenital infections that he is likely to do less harm in their later stages if he is thus tempted. And it is more probable that, if his patient improves, the improvement will be due to other things. So fixed are these things in the writer's mind that he sees little value in a prolonged discussion of dosage and method.

### NONSPECIFIC PROTEINS

At the high swing of the pendulum nonspecific or foreign-protein injections attracted a great deal of attention in urologic circles. The blare of trumpets soon died down, however, and, to a great extent, these injections have gone the way of the vaccines in the treatment of urogenital infections. It is a great misfortune that our most beautiful theories so often fail lamentably in clinical trial. With vaccines we aimed at stimulation of true immunity responses and our failures were more numerous than our successes. With foreign proteins we aim at leukocytic stimulus and, though we may get it, we rarely see it accompanied by greater curative response in the realm of urogenital infection. One who has studied microscopically the discharges of most such infections hardly can make himself feel that more leukocytes are needed in most of them. Their predominating feature is the outpouring of countless polymorphonuclear leukocytes, comparatively few of which carry bacteria with them.

*The value of foreign protein injections apparently is not of a very high order in infections of this tract. They have been lauded highly in the treatment of epididymitis, which generally does as well, or better, on other treatment carrying no danger of systemic reaction. In gonorrheal urethritis they are useless. Their value in gonorrheal seminal vesiculitis is, at least, debatable. In infections of the kidney pelvis, ureters and bladder they have little, if any, value. Theoretically, they should do good in chronic infections yet they rather rarely seem of benefit. It can be said of them that they rarely do harm aside from the febrile systemic reaction they cause if given in large doses. In the main, they are assuming the position of things to do when one is at a loss what else to try.*

They may be used in the form of vaccines, such as typhoid, the various types of commercial milk proteins and, even, boiled milk. The injections are given usually into the gluteal muscles. Large doses may

<sup>1</sup>Stitt, Clough and Clough. *Practical Bacteriology, Hematology and Parasitology*, The Blakiston Co., Philadelphia, 1938.

cause a decided chill followed by a sharp febrile reaction which usually subsides in several hours. Small doses occasion a slight malaise or no reaction at all. Opinions vary as to the value of a reaction, some holding that a profound one is beneficial while, perhaps, an equal number of enthusiasts advise a dose giving almost no reaction of which the patient is conscious.

Of similar nature is the procedure of autohemotherapy wherein a few cubic centimeters of the patient's own blood is withdrawn from the cubital vein and injected into his gluteal muscle. Here again we find a procedure, much lauded in some quarters, giving mostly disappointment.

### URINARY ANTISEPTICS

Until recent years our experiences with urinary antiseptics have been decidedly disappointing. For, with the exception of methenamine, Providence seemed to reserve all the brilliant successes for those who wrote of the countless so-called urinary antiseptics that have been served to us during the last decade. Despite the seemingly scientific and convincing build-up received by many of these preparations they generally brought disappointment for ordinary physicians. Indeed, so seldom did they behave as it was predicted they would that when, to our surprise, an occasional case seemed to obtain benefit we started to question ourselves and our use of the drugs, and think we must be rather poor doctors not to be able to duplicate the experiences of those who used so many adjectives in presenting them to us.

Thus, we were in rather a gullible frame of mind when, as usually happened, those "scientists" who called them to our attention started to point out the reasons why we failed where they succeeded. Either we paid no attention to urinary surface tension, as with caprocol, or we gave the patient too much or too little water, as with some of the others. Always we had failed in some small or great particular. We ordinary physicians were just a little too obtuse to catch the small but important niceties of drug administration. And, as should be expected, we tried again to the delight of those who manufactured such things. We played with surface tension and got no further than we did before. We colored up underwear with such things as pyridium, serenium, malophene, picochrome, mercurochrome-220, while the urinary bacteria chortled with glee and the patient got what mental comfort he could from the rainbow tints of the urine he passed. It was a spectral experience that should make many "investigators" blush and that we should try never to forget.

The outshining good in all of this clinical evil was that it stimulated some real investigators like Clark, Helmholtz, Braasch, Lyon, Dunlap, Cook and many others to great and telling efforts—efforts that really got us somewhere and placed things on a basis of science, which means truth. Not only did they give us the means whereby many infections could be overcome, but they paid just as careful attention to the reasons why some urinary infections could not be corrected by these means. Thus, today, one can talk about urinary antiseptics without lapsing into a dream state of wishful thinking. Of course, as in the past, the entire subject well might be labeled "The Domain of the Shifting If." The "if," however,

now takes a different direction than it did but a few short years ago. Then we were told that if we used this or another drug at a certain time and in a certain dosage we must be successful in a certain attractively high percentage of our cases. If we failed it was our fault or the patient's never the drug's fault.

Now the if has shifted so that we may expect results from a given substance only when we choose the proper substance to be used for the patient whose infection is of a type to be influenced by it and when we have removed those things that would prevent success. The field is still a complicated one and from a standpoint of human values it is perhaps well that it should be so. For there often is little gain if one by the blind use of an orally administered drug clears up the evidences of infection and allows to go merrily on its way the often serious pathology that was in reality the reason for the patient's having such an infection.

Both Hinman and Herman see great potential danger in a universally successful urinary antiseptic and feel that it is well that we have no such drug. They base their fears on the unfortunate fact that patients in whom the obvious evidences of urinary infection easily are banished rarely are subjected to the proper diagnostic studies that would reveal the underlying pathologic lesion that made the infection possible. Unfortunately this is true in a large percentage of cases and the greater becomes the clinical response to urinary antiseptics as a class the more will be the advanced urogenital pathology falling into the hands of the urologist. Most assuredly advance along this line will mark retreat along the line of discovery of early urogenital pathology. And such a retreat will render inefficient at least temporarily that which urologists have fought hard to instill into the minds of those in general practice.

Few things are of more importance to the patient with any urogenital malady than early and exact diagnosis. For years our urologists have tried to impress these facts upon us and in a large measure they have been attractively successful. Their success has made possible the discovery and removal at an early stage of much potentially destructive pathology. One has only to compare present conditions regarding renal tuberculosis with those prevailing twenty five years ago to see that these teachings have brought much fruit. Obviously these educational efforts have just begun and unless the urologists get very busy coming a few more slogans such as Hematuria means cystoscopy and the like diagnostic urology is due for what they call in aviation circles a dangerous tailspin.

To direct all of one's attention toward the clearing up of the urinary infection without exhausting every effort to determine just why each particular patient has an infected urine would be carrying us back to the older symptom chasing days wherein we did not know so much of the dangerous lesions to which such things usually are secondary. It is a thing entirely foreign to the views held by even the tyro in urology. For one does not spend long in the study of things urogenital without being deeply impressed by the fact that symptoms usually are such fallacious things that he who does not look everlastingly beyond them to their underlying causes soon will build up a reputation that is the envy of no one. What is true of him applies in an equal measure to all who are too easily satisfied in this

regard. Never was there a time wherein such things were more in need of being "cried from the housetops."

We should keep constantly in mind those things that so commonly prevent our urinary antiseptics from exercising their greatest permanent benefit. This is as true with our brilliant successes as it is of those cases wherein the oral administration of the chosen drug does not bring about the disappearance of the offending micro-organisms. Leaving the gonococcus out of the present discussion, we should remember that there are some acute urinary infections wherein our most careful diagnostic studies fail to reveal any local pathology. Many of these are of focal infective origin or accompany the acute febrile conditions. They last for a short while and usually clear up whether we treat them or not. Some few linger on for a while, but most of those that do, remain because there is urogenital pathology that causes them to persist. If, in these latter, we do succeed in banishing the bacteria and symptoms by our urinary antiseptics our success usually is only temporary, for some more bacteria come along and start things all over again. Consequently, if we fail to discover this urogenital pathology at a time when the proper diagnostic procedures are safe, we allow the patient to drift on to a later reckoning. By the nature of things, a majority of the persisting urinary infections are due either to an infective feeder in the kidneys or prostate gland or, even more often, to some obstruction in the tract causing urinary stasis. Occasionally, in the absence of demonstrable stasis, there is a colon bacilluria which not unusually lends itself to cure by oral antiseptics.

Much of the urologist's call for urinary antiseptics comes from persisting postoperative urinary infections. Particularly is this true of his newer method of electric excision of vesical outlet obstruction, and it is also true of many of his cases of surgical enucleation of the gland. In both the continuing infection is probably due to the persistence of residual urine, often in amounts too small to make themselves discoverable. Not uncommonly prostatic infections serve as the bacterial feeder and, in not a few of these, one must go as far afield as the tonsils and teeth to find the initial cause. Even in some few cases the persisting infection occurs in patients who, though they have no true obstruction, do not empty the bladder entirely because they stop before the act of urination is completed.

In brief, the intelligent use of such things as remove outstanding symptoms in many patients presupposes that he who uses them should be just as deeply interested in finding out at a safe and proper time just why, aside from the particular bacteria at play, his patient has the infection. In no other way can real justice be done to those who place themselves in our hands.

To avoid futility of effort one does well to determine just which bacterium is the causative agent and whether the urine is acid or alkaline. Many variations in the percentages of these microorganisms appear in the writings of different authors. Many of these differences are due to the predominance of women and children in the groups studied, for in them one encounters an inordinately high percentage of colon bacilli. On the other hand, this frequency would be greatly reduced in any group composed largely of adult males. Thus, in order to strike a fair average, there should

be included a mixture of all ages and sexes. This Cabor<sup>1</sup> has done by a study of the bacterial content of 877 cases at the Mayo Clinic. His percentages are as follows:

## URINE CULTURE FINDINGS

|   | Number | Per cent |
|---|--------|----------|
| <i>Escherichia coli</i>                 | 490    | 55.9     |
| <i>Aerobacter aerogenes</i>             | 91     | 10.4     |
| <i>Proteus ammoniae</i>                 | 48     | 5.5      |
| <i>Proteus</i> (species?)               | 9      | 1.0      |
| <i>Pseudomonas aeruginosa</i>           | 32     | 3.6      |
| <i>Pseudomonas</i> (species?)           | 11     | 1.2      |
| <i>Salmonella</i> (species?)            | 12     | 1.4      |
| <i>Alcaligenes</i> (species?)           | 10     | 1.1      |
| <i>Eberthella typhosa</i>               | 2      | 0.2      |
| <i>Shigella</i> (species?)              | 6      | 0.7      |
| Gram negative bacillus (unidentified)   | 23     | 2.6      |
| <i>Streptococcus faecalis</i>           | 105    | 12.0     |
| <i>Streptococcus</i> (green producing)  | 10     | 1.1      |
| <i>Streptococcus</i> (slight hemolysis) | 33     | 3.8      |
| <i>Staphylococcus aureus</i>            | 10     | 1.1      |
| <i>Micrococcus</i> (species?)           | 132    | 15.0     |
| Diphtheroids                            | 4      | 0.4      |
| <i>Neisseriae gonorrhoeae</i>           | 1      | 0.1      |

The more one deals with patients who have had some instrumental interference with the bladder, the more commonly he will encounter such bacteria as the proteus group, the *Streptococcus faecalis*, the staphylococcus, diphtheroids and gram positive bacilli.

Obviously, the action of all orally administered urinary antiseptics depends upon the ability of the patient's kidneys to excrete them in sufficient concentration. It thus becomes a matter of considerable importance to consider the patient's renal functional capacity. For, without proper excretion, many of the drugs employed today are not without toxic danger.

As certain bacteria flourish in an acid urine that survive with difficulty or not at all in one of alkaline reaction, it is important that we know what the urinary reaction is. And, as some of those that flourish in a mildly acid or alkaline urine do so with great difficulty when the reaction swings far to one extreme or the other, there arises the great need that we determine by our pH studies just how highly acid or alkaline the urine is. For instance, colon bacilli find a pH of 6.0 rather an ideal medium for growth, but at a urinary pH of 5.0 or less they survive with great difficulty. Because of this, Helmholz treated pyelitis in children with much success by carrying their urines from one extreme of reaction to the other and keeping it there for varying periods of time. Indeed, much of our present success depends upon this procedure.

Since the means whereby urinary reactions are changed from one side to the other of neutrality have been considered under the titles of Urinary Acidification and Urinary Alkalinization, there is little need to pursue the subject further in the present connection. Consequently, we can pass on to the various drugs and diets used for the eradication of urinary bacteria.

<sup>1</sup> Cabor, Hugh. *Modern Urology*, Vol. II, p. 511, Lea & Febiger, Philadelphia, 1936.

**The Ketogenic Diet.**—Introduced by A. L. Clark in 1931 and later described, the ketogenic diet finds its particular field in the treatment of infections with *Escherichia coli*, the *Aerobacter aerogenes*, proteus, some staphylococci and the *Streptococcus faecalis*. Its efficiency depends largely upon the excretion of beta-oxybutyric acid in the urine. According to Fuller, who first called attention to this fact, there must be a urinary concentration of this substance of 0.5 per cent if results are to be obtained. The urinary pH must be carried to 5.5 or lower. Though a highly effective procedure in those patients who can stand the diet, it is by no means an easy one for ambulatory patients. This is so of even the simplified ketogenic diet later described by Clark and Bigsby.<sup>1</sup> To be of the greatest value it is wise to make its use a hospital procedure if the proper degree of ketosis is to be gained and held. It finds a place of distinct value in the treatment of urinary infections of children, as shown by Helmholtz, and in the infections persisting after prostatectomy. Rarely is it brilliantly successful in the presence of infected residual urine.

Many patients cannot tolerate the large amounts of fat contained in the diet. Because of the frequent difficulties encountered the method largely has been replaced by other things.

**Methenamine** for many years was the outstanding urinary antiseptic and hardly deserves the neglect it has received of late years. Often, when all others fail one turns to it with striking success. Used properly it is of great value in many cases. Getting its worth by virtue of the fact that it decomposes into formaldehyde in an acid medium, it is obvious that the patient's urine must be acid in reaction and it must be possible for him to retain it for a considerable length of time. It thus is of little value in acute conditions associated with urinary frequency as well as in the presence of urinary incontinence. Indeed, it is contraindicated in acute inflammations of the bladder, adding only to the discomfort of the patient by virtue of its liberated formaldehyde. If the urine is not already acid it should be made so by the concomitant use of either acid sodium phosphate, ammonium benzoate or ammonium chloride. It should be discontinued if it causes hematuria, or upon the appearance of any evidences of kidney damage. Forcing of fluids dilutes the decomposed product far below the possibility of bacteriostatic or bactericidal action. Hence, it is best given with a normal or reduced fluid intake. It is practically useless in infections at the kidney level and of most value in those of the bladder. Its dosage and other considerations will be found in the section entitled *Internal Medicaments Used in Urologic Practice*.

**Mandelic acid** largely has replaced the ketogenic diet. It was shown by Rosenheim<sup>2</sup> that this substance had a bactericidal value in the urine equal to that of the beta-oxybutyric acid upon the excretion of which the value of the ketogenic diet depended. Both substances required a urinary concentration of 0.5 to 1.0 per cent and a urinary pH of from 5.0 to 5.5. Unless these can be obtained little or no antiseptic value accrues. It should not be forgotten that in an occasional case the pH of the whole urine is not that of the separate kidneys. These may vary con-

<sup>1</sup> Clark, A. L. and Bigsby, F. L., Jr.: *Jour. Urol.*, 37: 239, 1937.

<sup>2</sup> Rosenheim, M. L.: *Lancet (London)*, 2: 1083, 1936.

siderably both in their pH and in their ability to excrete the drug in bactericidal concentration. Helmholtz<sup>1</sup> draws attention to this in the following manner. A defective kidney will not secrete a urine of sufficiently low pH or a sufficiently high concentration of the drug to be bactericidal. This may apply to only a single kidney or to both kidneys. In cases in which mandelic therapy is used the normal kidney may excrete a urine which has a pH of 5.0 and contains 0.7 per cent of mandelic acid and a kidney badly infected may excrete a urine that has a pH of only 6.0 and 0.2 per cent mandelic acid; the former urine is highly bactericidal but the latter is not bactericidal at all.

Shortly following the introduction of mandelic acid there appeared ammonium sodium and calcium salts which as a rule are less irritating to the stomach. These are usually given to adults in from 2.5 to 3.0 gram doses four times a day and the fluid intake is limited to 1000 c.c. Constant check should be kept on the urinary pH and where necessary  $\text{NH}_4\text{Cl}$  or some other acidifying substance should be added to bring the reaction to a pH of 5.5 or lower. The course of treatment should be about two weeks and after a week's rest another course may be given if the first has been only partially successful or the infection has recurred as not infrequently is the case.

The mandelates are particularly useful in the presence of infections by the *Escherichia coli* and other gram negative bacilli and occasionally show some value in those due to *Staphylococcus aureus* and *Streptococcus faecalis*. Like all other urinary antiseptics they do best in uncomplicated cases. The use of enteric coated tablets simplifies their use in those cases wherein gastric symptoms make other forms impossible of use. (For the method of administration see section on Internal Medicaments Used in Urologic Practice.)

**The Sulfonamides** Perhaps no additions to our therapeutic armamentaria have caused such revolutionary changes in our treatment of infections than did the introduction of sulfanilamide and its later derivatives. Like many epoch making discoveries these drugs despite their commonly miraculous actions are not altogether without possible faults. Aside from their possible toxic misfortunes considered on page 251 there is a great danger that clinicians too readily will assume that the prompt disappearance of the bacteria taking part in a given infection means that the patient is cured. In this regard it is well to keep constantly in mind that the urinary bladder and the upper urinary tract rarely develop trouble just because bacteria reach them. These structures are singularly free from the dangers of infection by other than the tubercle bacillus and the gonococcus if they can function as was intended. In the presence of faulty emptying power or as the result of trauma they easily become infected. Further when these influences are corrected they generally show a prompt and often spontaneous capacity for freeing themselves of such infections.

Thus there is an ever present possibility that much that is of great future danger to the patient may be overlooked because of the highly dramatic clearing of an infected urine as the result of the administration of these drugs. Such being the case it is of importance that he who treats such

<sup>1</sup> Helmholtz H. F. J. A. M. A., III 1719 1938

conditions be constantly on the alert lest he pronounce patients cured before the most careful studies have been carried out to learn just why they developed their infections. To allow the mere facts that a purulent urine has become crystalline and the offending bacteria have disappeared to waft one to heights of enthusiasm that make him neglect such studies is to lay up for many patients a future none too attractive. For there generally is more in the question of cure than just the removal of pus and bacteria. Anatomical faults are not removed in this way, nor are pathologic ones that were the reasons for the temporary infective evidences in these patients.

As is the case with other urinary antiseptics the sulfonamides give their best results in uncomplicated cases, as should be expected. In the presence of renal stone, urinary stasis from any cause, postoperative sloughs and indwelling catheters they exercise little effect, as a rule. Even if they do seem to exercise a favorable influence under such conditions the improvement is seldom a lasting one unless the real precipitating factor has been removed.

In the presence of marked renal damage these drugs are far from being without great danger. They have the advantage of lending themselves to use in other cases of acute as well as chronic infections. It is the opinion of some that they are better in an alkaline urine than in an acid one. Others express the opinion that urinary pH is not an important factor. Some feel that high urinary concentration is of importance while others, notably Alyea, have had equally good results with much lower ones. This latter view is significant in view of the dangers of renal tubular deposits of sulfathiazole crystals in patients on a low fluid intake. Such crystalline deposits almost never occur upon the lower doses where fluid intake is 1000 cc. per day or higher, as has been pointed out elsewhere.

There is considerable evidence to show that, under proper conditions, sulfanilamide shows a favorable action against the following: *Escherichia coli*, *Proteus ammoniae*, *Proteus vulgaris*, *Aerobacter aerogenes*, *Streptococcus hemolyticus*, and the *pseudomonas*. Against the *Streptococcus faecalis* and the staphylococci it has little or no influence. Still, sulfathiazole is particularly effective in the presence of these latter and against most of the others for which sulfanilamide previously was advised.

As with the treatment of gonorrhea, different workers have employed different schemes of dosage. These, in main, correspond to the plans given in the section upon the treatment of that disease on a succeeding page. As with that disease, the response to medication, if there is a favorable one, occurs within the first few days and, if it fails to occur, one does best to discontinue the drug being employed and change to another member of the same group. With neither is there reason or good judgment in prolonged administration. Greater good accrues in some cases if, after a rest of a week or more, a second course of even the same drug is employed.

Neosarsphenamine has been used rather widely as a urinary antiseptic and finds its chief field in staphylococcic infections. Upon occasion it acts with brilliance and, far more often, it fails of any bactericidal action. It should be given in intravenous injections of from 0.3 to 0.6 gram once a week.



## DIET IN UROLOGIC PRACTICE

The successful treatment of some types of urinary infection by Clark in adults and Helmholtz in children through the dietary production of a state of ketosis has served to center attention upon the fact that not only do urologic patients live by what they eat but that unless some of them eat the proper things they often do not live in great comfort and some of them even cease to live. It also started us seriously thinking in a scientific fashion rather than in the old hit or miss way about what one could do toward the correction of some of the pathologic processes of the urogenital tract through the institution of a proper dietary regime. Of course urologists were always interested in diet of those patients having oxaluria, phosphaturia and in a less clear manner urinary calculi. Mostly the instructions given were those handed down to us by our forefathers and back of them was a wealth of clinical observation and empiricism but very little of deep physiologic chemistry.

Within the last few years things have changed greatly. No longer is the subject of urologic dietetics so largely one of taking away. In even a larger measure it is one of substitution and adding to and it has sloughed the old empiricism for a deeper knowledge of what are physiologic needs, how they can be met and how best to correct them when they go astray.

The work of the above investigators together with the later work of Higgins on urinary calculi has made it necessary for the urologist to do what he had not done before—to carefully and scientifically map out his patient's diet if he would prevent or overcome many perversions from normal. No longer does the careful worker wish all dietary matters upon the internist as so commonly was the case. He does as he should have done before. He carries out what studies may be required for diagnostic purposes; he determines how many calories his patient needs per day and then with equal care he works out in detail the diet for the case in hand. He does not satisfy himself and confuse his patient by saying avoid this or that but he tells him what he *can* eat and how much.

As the result of this changed attitude a number of different diet lists have been worked out by such investigators as Carl Helmholtz, Barborika Higgins and others which largely have served as patterns from which urologists made diet lists to fit the needs and possibilities of their individual patients. So valuable are these lists that they are here produced with credit to those who published them.

**Ketogenic Diet**—As is stated in the section on Urinary Antiseptics the ketogenic diet finds its greatest value in overcoming urinary infections. It is particularly successful in the presence of *Escherichia coli* and in the absence of urinary stasis. To be of value there must be brought about a urinary concentration of beta oxybutyric acid at least as high as 0.5 per cent and a pH of less than 5.5.

ELABORATE KETOGENIC DIET—CLARK AND BIGSBY<sup>1</sup>

## GENERAL INSTRUCTIONS

- 1 Satisfactory results cannot be obtained unless this diet is carefully followed. It is essential that no food or beverage other than that listed be taken.

<sup>1</sup> Clark, A. L. and Bigsby, F. L., Jr. Jour Urol., 37: 240, 1937.

2. All food must be accurately measured. A standard measuring cup, teaspoon, and tablespoon should be used.
3. Eat no sugars or sweets of any kind. Saccharine may be used as a substitute for sugar. Coffee, tea and seasonings may be used as desired.
4. Bran wafers must have no food value, and may be used as desired. Do not chew gum or tobacco. Smoking is permitted.
5. Water should be taken only in moderate amounts.
6. No cathartics are to be used, other than mineral oil, or bitter cascara. Milk of magnesia or other sweet cathartics will cause failures. Take no medicine unless prescribed by the physician.

### MENU PLAN

Include the following foods daily, and in the exact amounts specified:

|                                   |                                  |
|-----------------------------------|----------------------------------|
| Eggs.....                         | Two                              |
| Bacon.....                        | 4 strips 6" long                 |
| Vegetables (See list below).....  | 1½ cups                          |
| Whipping Cream (extra heavy)..... | 1¼ cups                          |
| Butter or Oil Mayonnaise.....     | 5 tablespoons                    |
| Meat. . . . .                     | 2½ ounces, or 3" x 4" x ¼" thick |

Menus I, II, suggest possible combinations. Many interesting menus may be planned, however, using different vegetables and preparing eggs and cream in various dishes.

### Possible substitutions

1. Two tablespoons Cottage Cheese, plus 1 teaspoon of butter or oil mayonnaise may be substituted for one egg.
2. One ounce of American Cheese or meat may be substituted for one egg.

### Vegetable list

|               |                  |                 |
|---------------|------------------|-----------------|
| Asparagus     | Brussels Sprouts | Greens, Beet    |
| Beans, String | Cauliflower      | Greens, Mustard |
| Broccoli      | Celery           | Greens, Turnip  |
| Cucumbers     | Green Peppers    | Sauerkraut      |
| Egg Plant     | Rhubarb          | Spinach         |
|               | Tomatoes         |                 |

### MENU I

Breakfast:

|                            |                  |
|----------------------------|------------------|
| Egg, poached . . . . .     | One              |
| Bacon . . . . .            | 4 strips 6" long |
| Bran wafers . . . . .      | As desired       |
| Butter.....                | 1 tablespoon     |
| Heavy whipping cream ..... | ¼ cup            |
| Coffee or tea .....        | As desired       |

Lunch:

|                            |                  |
|----------------------------|------------------|
| Crisp bacon .....          | 4 strips 6" long |
| Spinach . . . . .          | ½ cup            |
| Lettuce & tomato salad ..  | ½ cup            |
| Oil mayonnaise . . . . .   | 1 tablespoon     |
| Bran wafers .....          | As desired       |
| Butter.....                | 1 tablespoon     |
| Iced Coffee                |                  |
| Coffee .....               | As desired       |
| Heavy whipping cream ..... | ¼ cup            |

## Dinner

|                      |               |
|----------------------|---------------|
| Roast Pork           | 3" x 4 x 1/4" |
| Creamed cauliflower  |               |
| Cauliflower          | 1/2 cup       |
| Heavy whipping cream | 1/4 cup       |
| Lettuce salad        | 1/2 cup       |
| Oil mayonnaise       | 1 tablespoon  |
| Bran wafers          | As desired    |
| Butter               | 1 tablespoon  |

## Menu II

## Breakfast

|                      |              |
|----------------------|--------------|
| Scrambled eggs       | Two          |
| Eggs                 | 1/4 cup      |
| Heavy whipping cream | As desired   |
| Bran wafers          | 1 tablespoon |
| Butter               | 1/4 cup      |
| Heavy whipping cream | As desired   |
| Coffee or tea        |              |

## Lunch

|                      |                       |
|----------------------|-----------------------|
| Soup                 |                       |
| Celery diced         | 1/4 cup               |
| Heavy whipping cream | 1/4 cup               |
| Water                | 1/4 cup               |
| Salad                |                       |
| Orange sections      | 1/2 of a small orange |
| Oil mayonnaise       | 1 tablespoon          |
| Lettuce leaf         | One                   |
| Bran wafers          | As desired            |
| Butter               | 1 tablespoon          |

## Dinner

|                      |               |
|----------------------|---------------|
| Soup                 |               |
| Heavy whipping cream | 3/4 cup       |
| Spinach or tomato    | 3/4 cup       |
| Water                | 1/4 cup       |
| Chicken salad        |               |
| Diced chicken        | 1 3 cups      |
| Diced celery         | 3/4 cup       |
| Lettuce leaf         | One           |
| Oil mayonnaise       | 2 tablespoons |
| Bran wafers          | As desired    |
| Butter               | 2 tablespoons |

## SIMPLIFIED KETOGENIC DIET—CLARK AND BIGSBY

## GENERAL INSTRUCTIONS AS IN THE ELABORATE DIET

Include the following foods daily in the exact amounts specified

|                      |                      |
|----------------------|----------------------|
| Heavy whipping cream | 1 1/2 pints (3 cups) |
| Eggs                 | Six                  |

Any combination of two eggs and one cup of cream may be used at each meal. Below are three suggestions. If desired some cream may be used between meals with coffee or tea.

## Breakfast:

|                            |                   |
|----------------------------|-------------------|
| Scrambled eggs             |                   |
| Eggs .....                 | Two               |
| Heavy whipping cream ..... | $\frac{3}{4}$ cup |
| Bran wafers .....          | As desired        |
| Heavy whipping cream ..... | $\frac{1}{4}$ cup |
| Butter .....               | As desired        |
| Coffee or tea ...          | As desired        |

## Lunch:

|                            |                   |
|----------------------------|-------------------|
| Egg omelet                 |                   |
| Eggs .....                 | Two               |
| Heavy whipping cream ..... | $\frac{1}{2}$ cup |
| Bran wafers .....          | As desired        |
| Iced coffee                |                   |
| Coffee .....               | As desired        |
| Heavy whipping cream ..... | $\frac{1}{2}$ cup |
| Butter .....               | As desired        |

## Dinner:

|                                    |                   |
|------------------------------------|-------------------|
| Poached egg .....                  | One               |
| Baked custard or custard ice cream |                   |
| Egg .....                          | One               |
| Heavy whipping cream .....         | 1 cup             |
| Water .....                        | $\frac{1}{4}$ cup |
| Nutmeg and saccharin .....         | If desired        |
| Bran wafers .....                  | As desired        |
| Butter .....                       | As desired        |

## LOW CALORY KETOGENIC DIET—CLARK AND BIGSBY

GENERAL INSTRUCTIONS AS IN ELABORATE DIET EXCEPT THAT BUTTER OR OIL MAYONNAISE MAY BE USED IN ANY QUANTITY DESIRED, TO MAKE THE DIET MORE PALATABLE

## MENU PLAN

Include the following foods daily and in the exact amounts specified.

|                                   |                                  |
|-----------------------------------|----------------------------------|
| Eggs.....                         | Two                              |
| Crisp bacon. ....                 | 4 strips strips 6" long          |
| Lean meat... ..                   | 2½ ounces, or 3" x 4" x ¼" thick |
| Vegetables (from list below)..... | 2 cups                           |
| Whole milk or buttermilk.....     | ½ cup                            |
| Butter or oil mayonnaise.....     | 3 teaspoons, or more if desired  |

Possible substitutions same as in the Elaborate Diet

Vegetable list same as in the Elaborate Diet

## MENU I

## Breakfast:

|                        |                  |
|------------------------|------------------|
| Egg, soft cooked ..... | One              |
| Bacon, crisp .....     | 4 strips 6" long |
| Bran wafers .....      | As desired       |
| Butter .....           | 1 teaspoon       |
| Coffee or tea .....    | As desired       |

## Lunch

|                          |                      |
|--------------------------|----------------------|
| Cauliflower              | 1½ cup               |
| Salad                    |                      |
| Sectioned orange         | 1½ of a small orange |
| Lettuce leaf             | One                  |
| Bran wafers              | As desired           |
| Butter or oil mayonnaise | 1 teaspoon           |
| Baked custard            |                      |
| Egg                      | One                  |
| Whole milk               | 1½ cup               |
| Nutmeg or saccharin      | If desired           |

## Dinner

|                  |              |
|------------------|--------------|
| Roast beef       | 3" x 2" x ¼" |
| String beans     | 1½ cup       |
| Shredded lettuce | 1½ cup       |
| Oil mayonnaise   | If desired   |
| Bran wafers      | If desired   |
| Butter           | 1 teaspoon   |
| Tea              | If desired   |

## MENU II

## Breakfast

|               |                  |
|---------------|------------------|
| Tomato juice  | ½ cup            |
| Egg scrambled | One              |
| Bacon cr sp   | 4 strips 6" long |
| Bran wafers   | As desired       |
| Butter        | 1 teaspoon       |
| Coffee or tea | As desired       |

## Lunch

|              |            |
|--------------|------------|
| Soup         |            |
| Whole milk   | 1½ cup     |
| Celery d ced | 1½ cup     |
| Egg omelet   | 1 egg      |
| Greens       | ¾ cup      |
| Bran wafers  | As desired |
| Butter       | 1 teaspoon |

## Dinner

|               |            |
|---------------|------------|
| Broiled steak | 3 x 4 x ¼" |
| Asparagus     | 1½ cup     |
| Bran wafers   | As desired |
| Butter        | 1 teaspoon |

**High Vitamin Acid Ash Diet**—This diet finds its use in the prevention of the formation of alkaline urinary calculi. It has been used extensively by many as a means of preventing postoperative recurrences of renal and vesical stones. Higgins claims to have dissolved renal calculi by its prolonged use but it has not been nearly so successful for this purpose in the hands of most urologists. He insists that the urine should be kept constantly at a pH between 4.9 and 5.2 for this purpose. Such figures are by no means easy to maintain and it frequently is necessary to reinforce the diet with ammonium chloride or other acidifying drugs. It is the opinion of Herman that there is a definite risk of renal damage in some patients if this low pH is continued for more than a week if chemical acidifiers are required to bring the urinary reaction to this low level. He urges that the

general health of the patient and his caloric requirements should be watched closely and that the diet be reinforced by the administration of vitamins. He states, "We prescribe the following routinely: brewer's yeast (vitamins B and G), three tablets daily. Oleum percomorphum (average dose 10-20 minims daily) which yields large amounts of vitamin A and small amounts of D; cevitic acid (cebione tablets—one tablet equals 0.01 gram, equivalent to 20 c.c. of orange juice—vitamin C)."

### HIGH VITAMIN ACID ASH DIET (HERMAN)

(2000 calories)

| <i>For the day</i>                      | <i>Amount</i>       |
|---|---------------------|
| Milk . . . . .                          | 1 pint              |
| Meat, fish or chicken (lean) . . . . .  | $\frac{1}{2}$ pound |
| Eggs . . . . .                          | 2                   |
| Vegetables and fruits (see List)        |                     |
| Bread—whole wheat . . . . .             | 5 slices            |
| Cereal . . . . .                        | 1 serving           |
| Rice, corn, macaroni or cakes . . . . . | 1 serving           |
| Butter . . . . .                        | 1 oz.               |
| Cream . . . . .                         | 1 oz.               |
| Sugar . . . . .                         | 1 oz.               |

#### *Foods to avoid*

Nuts  
Beet greens  
Dandelion greens  
Figs  
Molasses  
Olives  
Parsnips  
Raisins  
Spinach  
Dried fruits and vegetables

#### *Neutral foods*

Sweet butter  
Candy (no chocolate bars)  
Cornstarch  
Lard  
Olive or salad oil  
Mayonnaise  
Sugar  
Tapioca  
Tea, coffee, Kaffee Hag, postum

**High Vitamin Alkaline Ash Diet.**—This diet finds its place in the solution of cystine calculi and as a prophylaxis against the formation of the other acid stones.

### HIGH VITAMIN ALKALINE ASH DIET (HERMAN)

(2300 calories)

| <i>For the day</i>                    | <i>Amount</i>     |
|---------------------------------------|-------------------|
| Eggs . . . . .                        | 1                 |
| Bread (whole wheat) . . . . .         | 5 slices          |
| Butter or mayonnaise . . . . .        | 4 tablespoonfuls  |
| Milk . . . . .                        | 1 pint            |
| Cream . . . . .                       | $\frac{1}{2}$ cup |
| Sugar . . . . .                       | 2 tablespoonfuls  |
| Cereal . . . . .                      | $\frac{1}{2}$ cup |
| Rice (cooked) . . . . .               | $\frac{1}{2}$ cup |
| Meat or fish . . . . .                | 2 oz.             |
| Potatoes . . . . .                    | 1 medium          |
| Vegetables (medium or high) . . . . . | 4 servings        |
| Fruits (medium or high) . . . . .     | 3 servings        |

} see list

<sup>1</sup>Herman, Leon: *The Practice of Urology*, W. B. Saunders Co., Philadelphia, 1938.

*Foods high in acid—acid*

Cereals—except in amount given above  
 Bread—except in amount given above  
 Eggs—except in amount given above  
 Meat, fish, fowl—except in amount given above  
 Cranberries  
 Flour  
 Pastry  
 Popcorn  
 Corn

*Foods neither acid  
nor alkaline*

Butter  
 Mayonnaise  
 Candy (except chocolate)  
 Cornstarch  
 Olive or salad oils  
 Sugar  
 Tapioca  
 Tea  
 Coffee  
 Postum

**Diet in Phosphaturia**—In its milder forms such as commonly are encountered during the course of gonorrhea, particularly in nervous patients, phosphaturia requires no treatment. The normal variations in the reaction of the urine from hour to hour are such as to make the voided samples oscillate between those in which the phosphates are in complete solution and those in which they have gone out of solution sufficiently to alter the appearance of the urine. On the other hand, there occur patients who, either because of faulty diet, urinary infection with alkali forming bacteria, or other things, constantly pass a urine in which the phosphates are out of solution.

In those marked cases due to urinary infection the ketogenic diet or the acid ash diet, both of which have been given in detail above, may find a place. More rapid, and often more permanent, results are obtained, however, from chemical acidification of the urine.

For the milder cases occurring in highly nervous patients it may be necessary only to quiet the patient's mind by psychotherapy of some kind, his nervous system by a mild sedative, have him force fluids and delete from his diet such things as tend to make his urine alkaline in reaction. At times it may be just as well to take nothing from his diet if it is a moderately well-balanced one, but to increase the quantities of acid-forming substances such as are to be found in the acid ash diet.

**Diet in Oxaluria**—While oxalate stones form only in acid urine, the various oxalate crystals may be deposited in acid, neutral or alkaline urines. Thus, the dietary call, except perhaps in true stone formation, is not one for alteration of the urinary pH but one to fit the digestive needs of the individual as well as to limit the quantities of those foods known to cause the appearance of such crystals in the urine.

With patients in good general health it usually is sufficient to reduce or eliminate such things as grapefruit, asparagus, tomatoes, spinach and other greens, plums, berries, rhubarb and large quantities of carbohydrates. Patients in whom there is an underlying pathologic or functional basis, of course, require attention to the gastrointestinal tract and to whatever other things may be the cause of their ill health.

**The Vitamins in Urologic Practice**—Modern investigative methods have shown conclusively that human existence and health depend almost as much upon the catalytic action of the various vitamins as they do upon those of the true body hormones. Unfortunately, the known actions of these things have been obscured by an avalanche of commercial and news-

paper pseudoscience and positive untruth. So blatant have these things been that they naturally have engendered a high degree of disgust in the minds of many physicians and, often, this has resulted in so great a degree of skepticism about these valuable substances as to foster the conviction that their value is far less than it really is. Obviously, our knowledge of the entire matter has advanced to such a point that we are not wise if we allow present conditions to drive us mentally to a point where we feel justified in almost dismissing these remarkable substances from our therapeutic efforts.

Certainly, as we study those conclusions that are based upon an adequately scientific foundation we are forced to the admission that he who treats the various diseases of the urogenital tract, in justice to his patients, cannot overlook the fact that a lack of certain vitamins can easily cause some of the pathology that previously has baffled him and that its intelligent treatment is largely dependent upon making up the body deficiency by the administration of the particular vitamin required. Indeed, there is much evidence to support the belief that the proper production of some, if not all, of the systemic hormones is dependent upon the presence of an adequate supply of vitamins.

It is true that much of our knowledge of the value of the various vitamins has been gained by experiments upon the smaller animals and, while one cannot always apply information thus obtained too literally to the human being, many of these findings have found an identical application in man. So important to the urologist is the entire subject that it will not be amiss to go into the known things about the more important vitamins in considerable detail and to cite some of the eminently safe conclusions that have been arrived at by both analogy and direct experimentation.

**Vitamin A.**—This vitamin is synthesized in the body from the provitamin carotene. Its dietary source is a wide one, as it is present in both animal and plant foods. Those substances particularly rich in carotene are cod liver oil, cream, egg yolk, butter and many vegetables and fruits. Carrots contain large quantities of it.

**DAILY REQUIREMENTS.**—It has been shown that children and pregnant or lactating women require far larger amounts of vitamin A than do others. The needs of the former range from 5000 to 9000 international or U.S.P. units per day while the needs of the latter range up to 12,000 units. Normal adults are supposed to require about 1500 i.u. daily.

**PHYSIOLOGIC ACTION.**—This particular vitamin has an action somewhat similar to that of parathormone in that it mobilizes calcium from the long bones. It has been called the mucous membrane vitamin because of its control of the integrity of mucous surfaces. It also controls the visual purple of the eye.

**VITAMIN A DEFICIENCY.**—The influences of a marked deficiency of this substance are many, and in them one finds a possible explanation of the etiology of quite a large number of urogenital lesions that have dwelt largely among those things that we have called idiopathic. Briefly stated, the manifestations of such avitaminosis are as follows:

- (a) Keratinization of mucosal surfaces as a reparative process of the early epithelial atrophy.



- (b) Irregular development of osteoblasts and odontoblasts eventuating in either atrophic changes or lack of development of the epiphyseal cartilages and the enamel and dentine of the teeth
- (c) Sterility in the male and female, through changes in the ductal system in the former and keratinization in the uterus and tubes of the latter
- (d) Changes in the retina producing the condition of night blindness
- (e) The formation of urinary calculi in rats
- (f) Atrophy of the adrenal glands

In these advanced changes due to marked deficiency in vitamin A one readily can see a number of etiologic leads, so far as changes in the urogenital system are concerned. This is particularly true in the questions of both male and female sterility in some cases. The possible influence of such deficiency upon stone formation suggests a close resemblance to the results of hyperparathyroidism. The common occurrence of keratinization in mucosal surfaces naturally turns one's thoughts toward those conditions of the urinary conducting structures wherein such changes are the only evidence of pathology. Along these lines it is natural to wonder what relation, if any, a deficiency of vitamin A may have in the occurrence of such things as leukoplakia, frank and obscure pseudomembranous trigonitis, cystitis cystica and, even, panmural cystitis. For in the last there usually is a pale, seemingly keratinized surface in close association with the injected area so characteristic of the lesions.

Vitamin A deficiency usually can be determined by the dark adaption test.

*Vitamins B, G (B<sub>2</sub>), and D*—These vitamins are of little interest to the urologist. What urologic pathology exists in persons showing a deficiency in either of these, apparently is independent of such a deficiency or is secondary to the physical states induced thereby.

*Vitamin E*—This particular vitamin has not lent itself to such accurate studies as have the others, by virtue of the fact that its biologic effects are extremely difficult to evaluate. However, it has been called the "antusterility vitamin." It is present in the germ of most cereals, leafy vegetables, such as spinach, lettuce, and watercress. Indeed, it is so widely distributed that body deficiency is unusual in those on a mixed diet.

*Physiologic Activity and Deficiency*—Most of our information in this regard is based upon studies in the smaller animals and there is at least some doubt about these all being due to deficiency of this vitamin alone. In the male animal it exerts its influence on the spermatogenic function and in the female upon the chorionic tissues and the embryo. In the former there is an inability of the sperm cells to cause impregnation though they may show no microscopic changes in the early stages. Later, there is an aspermia and a total loss of libido. In the female animal there is a circulatory change in the chorion which effects embryonal development and produces habitual abortion.

Whether or not any grade of these deficiency changes occurs in humans has not been accurately determined. There is, of course, the possibility that it may be a factor in sterility in the male and abortion in the female. There have been reports of the favorable influence of diets rich in vitamin E upon spermatogenesis in the human. These, however, are not sufficiently proved to be other than suggestive of the possible value of increases in the

amount of this vitamin in those with either aspermia or oligospermia. In the female it, of course, could be of value only in the early stages of pregnancy.

*Vitamin K.*—The discovery of the action of vitamin K in reducing the clotting time of the blood has shown the great value of its administration in the presence of hemorrhage. Therefore, it is highly indicated in those cases wherein the source of the bleeding cannot be approached locally and wherever there is hypoprothrombinemia. Where renal and vesical bleeding is accompanied by the rapid formation of clots its administration may be contraindicated as a possible means of increasing the clots and forcing the patient into a condition wherein surgery, otherwise not needed, may become imperative.

#### THE ENDOCRINE GLANDS IN UROLOGY

*Hormone Therapy.*—During the last few years our urologic literature has been flooded with reports of the results obtained from the use of one hormonal substance or another. Some of these reports are those of carefully controlled work. Others are not of so critical a nature and have done much to bring about rather a general state of confusion in the medical mind regarding the indications for and the results to be expected from hormonal administration. No one would deny that there are many things stated as "facts" in this regard that are merely dreams and deductions. Many of the dreams are rather wild ones and a goodly percentage of the deductions are of such a nature that they serve as decidedly weak foundations for true science. Clinical occurrences, that are in no sense unique, have been used as "proof" that one, by the administration of a particular endocrine substance, can bring about the most unlikely of changes. It was in this way that great discredit was brought upon almost the entire subject of endocrinology but a few decades ago. And it would be unfortunate, indeed, if history should repeat herself at a time when the tireless work of many careful investigators has supplied us with so many incontrovertible facts upon the actions of these most remarkable substances.

The rather common tendency to leap to the administration of such products without a careful analysis of the indications for them, if any, and a failure to realize their possible untoward actions, have resulted in great harm to many patients. For, beyond a doubt, these substances can be as harmful to some as they are beneficial to others. This is particularly true of the so-called sex hormones, not a few highly fertile males having been rendered sterile by their injudicious use.

Viewing the hormones as a group it is much in evidence that they are both developmental stimuli and agents for the maintenance of the development they have been instrumental in bringing about. To use them where such development is complete and where the proper maintenance balance is being held, generally is to use them where they are not indicated. Thus, it seems appropriate to confine their use largely to those periods of life wherein development takes place and, from a more experimental angle, to those few individuals of greater years in whom urogenital development and the institution of the secondary male characteristics have failed to reach that point which we consider normal.

To use them for things that predominantly belong to the psychic pro-

cesses such as faulty power of erection and that decidedly elusive something called *libido* in otherwise normal males, is to enter a field wherein faulty interpretations are sure to be the rule and safe ones the infinitesimal rarity. Even if such things did happen as the result of hormonal administration, one would be treading rather a dangerous road for his patient. For he, in a large measure, would be entering that field which now bears the name of replacement therapy and he would be making his patient dependent upon something that would have to be continued as long as his victim wished to be more than of supporting use to his enamorata.

Replacement therapy is just what the name implies. It is the replacement of something that is lacking. And there is no reason to suspect that he who suddenly finds himself impotent lacks anything but the proper set of ideas. Nor is there any reason to suspect that he who, from much the same cause, finds himself insufficiently interested in the flowers of love to gather a pleasing bouquet, is lacking in any particular endocrine. What both need is a different view of life and its opportunities and a confidence in self that precludes such misfortunes. These things seldom are given by hypodermic medication unless he who gives the injections is at the same time, a psychotherapeutic supersalesman.

Perhaps one of the most tempting fields for endocrine experimentation is that of sterility. The presence of such conditions as *aspermia*, *oligo spermia*, *nectospermia* and *spermatozoal deformity* would seem to offer sufficient evidence that something was lacking. And, as spermatogenesis is a function dependent upon a proper endocrine balance, it is only natural that the medical mind should turn to the consideration of supplying the lacking stimulus. It seems so scientifically satisfying. The only thing wrong with it seems to be the fact that it fails to work. Indeed there is ample evidence that it often retards or destroys what spermatogenic function there is. So true is this that the most careful workers in this field insist that these substances should not be employed in the presence of even normal spermatogenesis unless there is an imperative reason for their use and the patient is perfectly willing to be made sterile. And, to insulate against possible later medicolegal annoyances, it might be an excellent plan to have him say so on paper.

These are not all of the disquieting results that may follow the hazard or, even, the apparently judicious employment of hormonal medication—things that might even take place in that developmental stage wherein one more often finds scientific justification for such measures. One who views the photographs of those children wherein the most precocious development of the external genitalia has taken place would hardly expect parental pride over such an occurrence. Nor would he expect such a child to reap a particularly bright future. Even in the most carefully carried out of hormonal treatments in childhood, the balance may swing far to the unattractive side, as one can sense from Powell's<sup>1</sup> report of the occurrence of prostatic hypertrophy in a boy seventeen years of age.

All of which means that hormonal medication should be based upon a real need for the particular hormone employed and eternal watchfulness for untoward influences. In no other way can these most remarkable secretory products be made to give even a fraction of their great good.

<sup>1</sup> Jour Urol., 41 706 1939

From a urologic standpoint they lend themselves to the overcoming of much that is distressing, often devastating, to normal human contacts and to individual personality. Largely, their uses have been confined to lack of development of the internal and external genitalia and the lack of their secondary effects. Among these should be mentioned micropenis, microtestis, cryptorchidism, lack of development of secondary male characteristics, and even eunuchism and eunuchoidism, all of which might be classed as developmental faults. And, as has been said, they have been tried for spermatogenic debilities of one type or another. Also, they have been used experimentally in prostatic hypertrophy.

In the correction of the several developmental faults, where measures have been taken toward that end before the usual age of puberty, the results often have been of a most miraculous nature. After that age, there have been some striking results, though their percentages have been much smaller. Increases in the size of the internal and external genitalia and more or less establishment of the later sexual characteristics have been by no means rare. In true eunuchs there have been brought about personality changes and some physical changes that made them far more contented with their lot. Here, however, hormonal administration has been true replacement therapy, the good results of which usually vanished upon its discontinuation—they could be maintained only by continued medication and, often, this failed.

As we pass from these things to others for which such medication has become almost the vogue, we find considerable difference of opinion among the many essayists. For this reason it might be best to consider these differences of view separately for such things as the treatment of cryptorchidism, secondary sexual characteristics, spermatogenesis, and prostatic hypertrophy.

**Cryptorchidism.**—In a study of the clinical results claimed to have been obtained by the hormonal treatment of cryptorchidism we find much variation on some features and great uniformity in others. Most of these differences fall, as should be expected, in the numbers of successful testicular descents brought about. These figures vary from 20 to 72 per cent of the cases. Among the more conservative reports, one finds the percentage of successful results hovering rather closely around 30 per cent. It is to be expected that there should be much diversity of opinion about a condition that so commonly corrects itself. That such spontaneous correction is common is seen in the figures quoted in the chapter on Cryptorchidism. It is here stated that this condition occurs in one of 25 or 30 boys under fourteen years of age as against one in 250 beyond twenty-one years of age. Despite these variations in percentages, however, practically all workers agree that such treatments are virtually useless after puberty, which, again, urges the wisdom of early attention to the condition.

In practically all of these reports one finds agreement upon the scrotal changes, an increase in the size of the penis and, perhaps, the testis and a greater ease in operation upon the failures than holds in those who have received no hormonal treatments. On the other hand, there appear reports to demonstrate that such treatments should be carried out with the greatest care, as previously has been said.

So far as the sex hormones applicable to the male are concerned they divide themselves into two groups. First, there are the anterior pituitary-like hormones which exert their influences upon the testicle as a stimulant to its activity. Obviously the value of these is dependent upon the presence of testicular tissue capable of functional stimulation. A properly functioning testicle does not need such stimulation and little good should be expected of such medication under normal conditions.

Second, there are the replacement substances of which testosterone is the outstanding example. These in the main may do what the testicles have failed to do, such as the institution of secondary sexual changes. Apparently their chief danger lies in their common secondary influences upon the testicle itself. And their exhibition in too large or too prolonged doses may, and commonly does, check spermatogenesis and favor true testicular atrophy. This is in line with much that takes the place in other internal organs when the substances Nature intended they should produce is artificially supplied. The call for their secretory activity is reduced or entirely removed and they go into a temporary or permanent sleep. Upon the withdrawal of the replacement therapy most of them again take over their physiologic task unless they have reached a state of true atrophy. This has been shown conclusively regarding pancreatic activity and has brought sanity into the use of insulin. There is much need today for a like judgment in regard to the use of sex hormones.

**Secondary Sexual Characteristics**—As a next step it was only natural that attention should be directed to the possible effects of such therapy upon testicular deficiency, both as to the development of secondary sexual characteristics (which, of course includes that illusive something called libido and all that is supposed to go with it) and as to the question of spermatogenesis.

Changes in secondary characteristics lend themselves to objective study, while an increase in libido is a thing for which one must take the patient's word. In this latter, as one could predict, there appears much that fittingly could be labeled 'wishful thinking'. One, however, should not be misled so easily about whether or not real secondary sexual characteristics are developed where they previously were largely lacking. But even here, he finds much of a decidedly contradictory nature. About as far as it is safe to go is to make the statement that in some adults these things do occur and in a far larger percentage of such patients they fail to materialize. Which, of course, leaves the matter in the state of experimentation wherein one is justified in making the effort, but he should not consider himself altogether a poor doctor if his results fall short of some of the enthusiastic claims that have been made.

**Spermatogenesis**—In the question of spermatogenic function one, by the nature of things is dealing with patients of an age wherein the least brilliant results should be expected. Also, he is dealing with a subject that lends itself to a rather accurate study of the results obtained. And, yet, despite this ease with which gains or their lack can be determined, investigators are by no means in accord. On the one hand, we find Rubenstein<sup>1</sup> reporting a definite increase in spermatozoa above the normal number after treatment periods varying from four to seven weeks and remaining so after

<sup>1</sup>JAMA. ab 111 655 1938

treatment was discontinued. On the other hand, we find that extremely careful clinician, Richard Chute,<sup>1</sup> making the following statement: "The therapeutic injection of gonadotropic substances not only does not stimulate the gonads but injures them, etc." And we find Koch agreeing with him, E. P. McCullagh<sup>2</sup> warning against the use of testosterone, "In patients in whom any spermatozoa are present or in whom spermatogenesis is normal," and Kretschmer definitely leaning in the same direction. Regarding the influence of hormones in the sterile we find Chute<sup>1</sup> saying: "Since nothing can be done for sterile adults with markedly or completely hypoplastic testes, etc." And, all in all, we observe a field wherein the careful clinician would do best to tread with care. Whether or not the substance obtained from the serum of pregnant mares, gonadogen, will change this picture remains to be seen.

**Prostatic Hypertrophy.**—Following the appearance of Lower's work upon the hormonal aspects of prostatic hypertrophy much hope was aroused that, at last, a way had been found to prevent its occurrence and, perhaps, to cure it without operative procedures. This hope, however, soon was dissipated. We have not found a preventive measure nor have we obtained the longed-for cure. It is apparent from many reports that, by the administration of testosterone propionate or other gonadotropic substances, many patients in the early stages of hypertrophy can be given varying degrees of symptomatic relief. Cary<sup>3</sup> reported relief in 6 out of 26 patients, Walther and Willoughby<sup>4</sup> in all of 15 cases and Lower<sup>5</sup> in 63 per cent of 80 cases. In most cases the patient felt better, he had less frequency of urination and, in some few, there was a reduction in or disappearance of the residual urine. None report a reduction in the size of the gland or any change in its histopathology.

<sup>1</sup> J.A.M.A., 107: 1855, 1936.

<sup>2</sup> J.A.M.A., 112: 1037, 1939.

<sup>3</sup> J.A.M.A., 111: 480, 1939.

<sup>4</sup> Jour. Urol., 40: 135, 1938.

<sup>5</sup> Jour. Urol., 37: 555, 1937.

## CHAPTER VI

### ANESTHESIA AND MINOR SURGICAL PROCEDURES

#### ANESTHESIA

In office practice, particularly for the performance of minor surgical procedures, regional or local anesthesia occupies a place of great prominence. It is used either by injection and retention in the urethra and bladder, as has been described in the section on cystoscopy, or by injection into the subcutaneous tissues. More complete anesthesia frequently can be obtained in many cases by caudal anesthesia or sacral nerve block. Some few make use of the transient general anesthesia brought about by the intravenous injection of substances such as pentothal sodium and evipal. For intravenous use most barbiturates are too prolonged in their influences to lend themselves well to office use.

The effect of most of the substances used for infiltration anesthesia wears off in approximately forty-five minutes, some of them in thirty minutes. For this reason Bandler has urged the use of diothane, the effect of which, according to him, usually continues for twenty-four hours and relieves much or all of the postoperative discomfort occasioned by minor operations about the genitalia.

**Procaine Hydrochloride**—This substance, a white crystalline powder, is generally used in strengths of from 0.5 to 2.0 per cent in salt solution. The latter strength is used only for surface application. It does not remain stable for any length of time unless kept in a dark container. Usually, it is prepared fresh from the crystals and boiled for a short time for sterilization. It diffuses rapidly through the tissues, for which reason many add a few drops of 1:1000 adrenalin solution to the quantity prepared. Procaine produces its anesthesia within 5 minutes and the effect lasts for approximately 45 minutes, as has been said. It is far less toxic than is cocaine and it is claimed that these toxic symptoms can be avoided by the previous oral administration of a barbiturate. If used in large quantities the lesser strength should be employed.

**Diothane**.—This drug is a derivative of phenyl urethane and occurs in the form of white, fluffy, needle-like crystals. It dissolves slowly in water to give a saturated solution of 1.05 per cent strength. It generally is used in strengths of 0.5 to 1.0 per cent. Being relatively stable, these solutions may be boiled for a short time for sterilization. Diffusing very slowly through the tissues, the full anesthetic effect requires from ten to fifteen minutes. Its anesthesia lasts for 24 hours or longer and care must be taken not to inject too much in one spot, as sloughing has been known to result. Though it is about three times as toxic as procaine hydrochloride, its slower absorption and the fact that not more than a third of the quantity need be used, make it equally as safe (Bandler). No adrenalin should be added to the solution, because of its slower diffusion. Its separation in alkalies urges its fresh preparation as even the alkalies in ordinary glass

will cause separation. If kept for any length of time it should be in a Jena glass container.

**Percaïn (Nupercain Hydrochloride).**—This drug remains stable after repeated sterilizations, has an anesthesia duration of from six to eight hours, and is used for infiltration anesthesia in the strength of 1:1000.

**Ethyl Chloride.**—Except for the opening of acute suppurative areas close to the skin this substance finds little use in urology. It is sprayed upon the area to be incised and its rapid evaporation causes anesthesia of varying degrees from a virtual freezing of the skin.

**The Technic of Local Infiltration Anesthesia.**—The site of injection of the solutions used for local anesthesia about the genitalia depends largely upon the areas to be operated upon. If it is desired to operate upon the scrotum it is necessary to make a line of infiltration which includes both the penis and scrotum. Usually this is done by starting at one external inguinal ring, carrying the line of injection entirely around the scrotum about a half inch beyond its line of junction with the skin of the thighs and perineum until the other external inguinal region is reached and, then, across the pubic region to the point at which the injections were started.

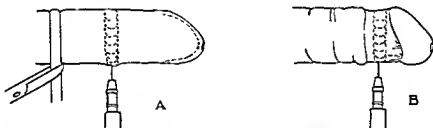


Fig. 148.—Method of local anesthesia for minor operations on the penis or its integument. *A*, With a tourniquet placed at the base of the penis, the shaft is encircled by a ring of the anesthetizing solution as described in the text. *B*, A ring of anesthesia, using far less solution, is then made under the postcoronal tissues and a few drops of the solution are injected into the frenum.

If only the scrotal surface is to be incised this usually gives complete anesthesia. If, however, deeper work is to be done, it is best to inject about 3 c.c. of the anesthetizing solution into each spermatic cord, if diothane is not being employed. In doing this latter there is need for even more care that the injection is not given into a blood vessel. In any type of infiltration anesthesia one should assure himself, by a reverse pull on the syringe piston, that a blood vessel has not been entered. In procaine anesthesia it is best to employ a solution containing 1 or 2 drops of 1:1000 adrenalin solution to prevent too rapid absorption.

Before introducing the needle, the skin surface should be cleansed thoroughly with soap and water, washed with alcohol, and it is well to make a line with tincture of iodine along the entire surface wherein injections are to be made. Care should be taken that none of the iodine is placed on the extremely sensitive scrotal skin.

If the operative work is to be confined to the penis alone, the line of injection of the anesthetic may be either one entirely encircling the base of the organ or it may be in the middle of the penis if that point is not too near an infected region. If the anesthesia is placed at the penile base it is well to have some adrenalin in the injected solution to retard its absorption.



If on the other hand a midpenile encircling injection is carried out absorption can be prevented by placing a catheter tourniquet at the base of the penis and holding it with a hemostat (Fig 148). This should be removed before any stitches are placed so that bleeding points may be cared for properly. Otherwise postoperative hematoma is of common occurrence. Such circular anesthesia particularly in the performance of circumcision does not always give complete anesthesia to the reflected layer of the prepuce particularly in the lateral postcoronal regions and at the frenum. Where this is not complete it can be made so by the circular injection of a small quantity of the fluid along the line of mucosal incision taking particular care that some of it infiltrates the frenal region. If too much fluid is not injected there will be little distortion of the projected line of incision.

These encircling lines of anesthesia particularly those of the skin usually can be made with a single insertion of the needle providing one uses one 2 inches long. The underlying areolar tissue is so loose that the needle can be plunged into the skin at the median raphe carried around the side to the midline on the dorsum and the fluid injected as it is being withdrawn. The needle is withdrawn until its point is just beneath the skin. It is then passed around on the uninjected side and the circle of injection completed. For such skin anesthesia it seldom is necessary to use more than 5 c.c. of solution while 2 c.c. is ample for the circular injection in the postcoronal and frenal regions.

If the prepuce cannot be retracted its cavity can be filled with either a 2 per cent coca solution or 5 per cent alypin jelly which should be retained for 5 minutes.

**The Technique of Caudal Anesthesia**—The patient lies upon the abdomen with a cushion under the pubic bone to elevate the buttocks. The entire sacral region is carefully cleansed as though for a surgical operation. The finger is drawn upward along the coccyx until it strikes the first midline projection of the sacrum. It then is brought down for a short distance until it locates a small bony prominence on each side of the midline the sacral cornua. If a triangle is made by a streak of iodine with these three points as its angles the center of the triangle will overlie the point at which injection is to be made. This point also should be marked with iodine solution for both localization and sterilization. After such sterilization it is well to introduce a few drops of the anesthetizing solution intradermally.

A small calibered flexible needle with a good cutting edge and about 3 or 4 inches long then is plunged at an angle of 20 to 30 degrees into this midtriangular point with its bevel upward until it strikes bone. Before it strikes the bone however there is imparted the sensation of its having passed through a layer of rather dense fascia. Having reached the bone the needle is withdrawn slightly and its point carried upward into the sacral canal. In order to do this the manual end of the needle must be carried well down until it lies practically in the long axis of the patient's trunk. The point of the needle then is passed well up into the sacral canal. If any bony resistance is encountered its direction should be changed until it passes freely in the proper direction (Fig 149).

In inserting the needle it should not be attached to the syringe. If spinal fluid escapes through the needle it should be withdrawn to a point

where this does not occur. If blood escapes it may be necessary to withdraw it completely, cleanse its lumen by injecting some of the solution through it and reinsert it.

For such anesthesia it is customary to inject from 25 to 30 c.c. of a 1.0 per cent procaine-adrenalin solution. Half of this is injected at insertion and the rest as the needle is withdrawn slowly. If there is any resistance to the free flow of the fluid it is probably because the needle point is in the periosteum and it should be withdrawn slightly until the fluid flows freely. During injection, the sacral skin should be watched carefully for any swelling that may appear. Such swelling does not take place if the needle is where it should be and is due to the fact that the needle has not entered the canal but has gone up the external surface of the sacrum.

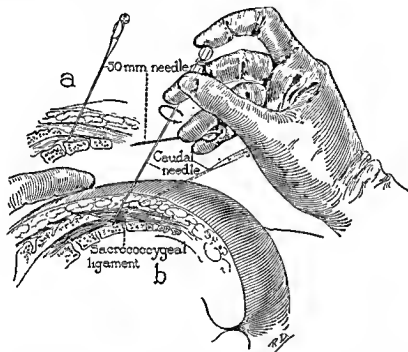


Fig. 149.—Diagrammatic illustration of the method of producing caudal anesthesia. (Buie, *Practical Proctology*, W. B. Saunders Co., Philadelphia.)

When such injections are properly carried out there usually occurs, in about twenty minutes, complete anesthesia of the pelvic viscera and the entire pelvic floor. Commonly there is relaxation of the anal sphincters so that, if the bowel contents are fluid, some fecal matter may escape. Also, there is a relaxation of the vesical outlet that easily might mislead one into a cystoscopic diagnosis of tubes where it did not exist. Upon rare occasions, where technic seems to have been perfect, anesthesia is incomplete or even absent.

Sacral nerve block anesthesia rarely, if ever, is used in office urology.

**Intravenous Anesthesia.**—In some respects, the need for a briefly-acting, more than reasonably safe general anesthetic has been supplied by the method whereby solutions of such substances as pentothal sodium or evipal

are injected into the blood stream. Both these substances seem to lend themselves well to anesthesia for the performance of brief urologic operations and, particularly, to the carrying out of cystoscopic studies upon highly apprehensive patients or in those in whom existing conditions speak for great pain, such as vesical tuberculosis. Both substances are proprietary preparations and they should be given in the manner described in the pamphlets accompanying them.

The writer has had no personal experience with this method of general anesthesia but has discussed the subject with Dr. Henry S. Ruth,<sup>1</sup> of Philadelphia, who has had a vast amount of experience with the production of anesthesia by this and other means. Dr. Ruth's voiced conclusions essentially are as follows:

1 He feels that pentothal sodium is the better drug, as it causes fewer after reactions.

2 The anesthesia is quick, complete and brief.

3 Neither he nor the manufacturers advise its use for the present in ambulatory cases.

4 Certainly, if it is given to ambulatory patients they should not be dismissed until the common after dizziness has disappeared and, even then, they should be accompanied by some one.

5 The dizziness commonly lasts for from one half to one and one half hours. Upon only one occasion did it persist for as long as three hours.

6 Patients awake in a happy, exhilarated frame of mind as though mildly under the influence of alcohol. There is no gastro intestinal disturbance or vasomotor alteration of moment, and Dr. Ruth has had no fatalities.

#### MINOR SURGICAL PROCEDURES

**Circumcision**—Circumcision is indicated wherever the preputial meatus is too small to be retracted over the glans penis, as a means of preventing recurrent attacks of balanoposthitis in the presence of a redundant prepuce, whatever repeated papillomatous growths occur on the glans or the reflected layer of the prepuce and in those cases showing repeated skin breaks and scar formation of the preputial margin. It is often of value in preventing the occurrence of herpes progenitalis and may be advisable in persons having much irritating preputial moisture in the absence of phimosis or other abnormality.

In children under twelve years of age, and often in older, highly nervous individuals, general anesthesia is needed for the performance of circumcision. In the newborn no anesthesia is necessary, as a rule. In others, the operation can be done under local anesthesia without the occurrence of pain. A number of different methods of producing anesthesia have been used. That wherein a needle is plunged into the corpora cavernosa is certainly not the best, as hemorrhage into the corpora and even abscess formation have been known to follow it.

The means whereby anesthesia is produced for the performance of circumcision is described in the section on Anesthesia.

The two most common errors made in the performance of circumcision are the removal of too much skin and the removal of too little of the re-

<sup>1</sup>Dr. Ruth's paper on the subject probably will appear in the J.A.M.A. before the appearance of this book.

flected surface of the prepuce. The former is prone to give much discomfort on erection and the latter everts a sensitive surface which gives discomfort and itching from the irritation of the clothing. Both of these errors are most common where preputial clamps are used for the performance of the operation. One who thinks he should leave much of the reflected layer with the idea that it will keep the corona covered, will find that, instead of this being so, the reflected layer makes a sensitive fold back of the corona, which it in no way protects.

A decision as to the proper amount of skin surface to leave is not always an easy matter, particularly in the presence of an extremely long prepuce. One is perfectly safe in the presence of great redundancy if he grasps the preputial margin at its dorsal aspect with two pairs of forceps and carries his incision between them, in the midline, until it reaches a point just proximal to the level of the tip of the glans when the skin is not pulled

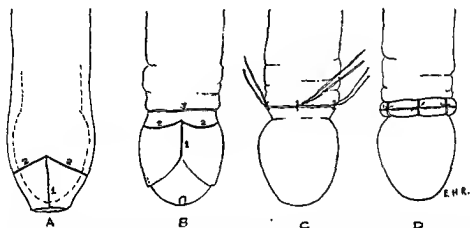


Fig. 150.—Diagrams to show the method of circumcision described in the text, together with the so-called military dressing to the wound edge. *A*, The first and second incisions include the skin and reflected layer. Cut 1 extends half way back on the glans and cut 2 encircles the prepuce. *B*, The skin is drawn back on the shaft of the penis and cuts 1 and 2 are made. *C*, Stitches left long to hold the narrow strip of oil-soaked gauze known as the military dressing (*D*).

forward. From the upper extremity, incisions should pass diagonally downward and forward so that they meet on the under surface of the penis at a point distal to that at which these lateral cuts were started.

Ordinarily, it is well to make these lateral cuts follow the line of a 30-degree angle with a line falling perpendicularly across the long axis of the penis. Such a method leaves a sufficiently wide skin opening. Where there is no great amount of redundancy, less of the skin should be removed.

After the skin has been removed, the penile skin should be retracted on the shaft of the organ and the mucous surface trimmed so that it makes a cuff around the corona not more than  $\frac{1}{4}$  inch wide. This leaves ample room for the required stitches and, if too much skin has not been removed, there will be no sensitive cuff of mucosa exposed when healing is complete.

When the tissue has been cut away the penile constriction, if any has been used, should be released and the bleeding vessels should be tied or

otherwise cared for so that the wound surface remains dry. Particular care should be taken to ligate the vessels at the frenal region as these are the ones that most commonly cause subsequent bleeding if they have not been ligated.

The skin edge should be stitched to the mucosal edge so that none of the deeper tissues pout through the wound edge. Perhaps the best way in which to approximate the wound edges is by the use of number one catgut leaving the ends sufficiently long to be tied around a gauze strip saturated with an antiseptic oil. This so called military dressing protects the wound edge keeps it clean removes the necessity of frequent changing and comes off at the end of three or four days when the stitches are absorbed. Around this an easily removable gauze dressing should be placed and changed on the second day to prevent urinous odor from wetting of the dressing.

Much after discomfort can be prevented by the use of an ice bag for one or two hours starting within a half hour of the termination of the operation.

*Dorsal or Lateral Slits*—The single dorsal or the two lateral slits of the prepuce are indicated in the presence of ulcerations of the glans where the prepuce cannot be retracted and circumcision should not be done. Even in the presence of slight ulcerations under like circumstances a dorsal slit is justifiable for the performance of a dark field study of the lesions. Before these are resorted to however it is well in the presence of marked swelling to make efforts to reduce the swelling. For not uncommonly it is the swelling alone that causes the phimosis.

In the performance of such incisions it is best to use injection of anesthesia along the line of the proposed incision. Often it is not possible to produce good anesthesia of the reflected layer by such a method and it may be wise to inject either 2 per cent cocaine or a 5 per cent alypin jelly into the preputial sac after it has been washed out carefully as has been suggested for the performance of circumcision in the section on Regional Anesthesia. If there is much skin infection circular anesthesia further back on the shaft is safest.

No effort should be made to suture the incision edges in the presence of marked infection. They should be left open and their wet dressings should be changed frequently.

Some have used cautery circumcision as a substitute for dorsal and lateral slitting of the prepuce. Usually this is successful but in the presence of rapidly spreading chancroid it may be followed by much loss of skin surface.

*Technic of Meatotomy*—In urologic parlance the term meatotomy is understood to mean the enlargement by incision of the external urinary meatus. Where other orifices are thus enlarged it is customary to use a more highly localizing designation such as *ureteral meatotomy* and the like.

An abnormally small external urinary meatus is a very common condition which may be the cause of serious middle and upper tract pathology particularly in children. Such narrowings are far more common in the male but they occasionally do occur in the female as a developmental fault or as the late result of local pathology.

It might be assumed that a thing as obvious as a pin-point urinary meatus would not escape medical discovery. Such an assumption, however, would be highly erroneous. For it is common to find children and, even, adults, the victims of varying degrees of urogenital pathology directly traceable to such a narrowing who have been under medical care for months or years. In immature males a pin-point urinary meatus may be the cause of such grave back pressure pathology in the bladder, ureters and kidneys, that it should be a matter of routine with obstetricians to inspect the urethral opening and to do a meatotomy whenever it is found to be abnormally small.

One safely can say that the fixed indication for the performance of a meatotomy is the presence of an abnormally small opening. There, however, may be reasons why it should be delayed, at times. In the presence of acute local infections it commonly is wise to take measures to overcome them before any cutting procedures are employed. This is particularly so in the presence of gonococcal infections wherein it has been rather common custom to proceed at once with a meatotomy. The writer, having seen several cases of gonococcal arthritis immediately follow meatotomy, is firmly of the conviction that every effort should be made to cure the gonorrhea before a meatotomy is done. In extreme cases where the opening is of extremely small caliber this may not be wise but such cases are rare.

In the performance of meatotomy it should not be forgotten that at the junction of the fossa navicularis with the penile urethra is a natural narrowing, the so-called valve of Guérin, which, in the presence of meatal narrowing, itself is commonly almost as narrow. Thus, if real good is to be accomplished, this area should be investigated. This usually can be done by passing either a small bulbar sound or a probe into the meatus and studying the lateral walls of the urethra for obstructing bands. Even if these are absent a sound should be passed a short distance into the canal following the meatotomy. By such a procedure one not only assures himself that there is no such obstruction but he splits these narrow bands of tissue if they are present.

Narrowings of normally placed urethral openings do not lend themselves to dilatation by sounds. Not only is such a procedure extremely painful but its results are decidedly disappointing, for in a short while the opening has contracted to its former dimensions. In contradistinction to this, the meatus in first degree hypospadias commonly does lend itself to such dilatation and it often is kinder to enlarge it in this way. Such patients almost invariably project the urinary stream forward both before and after dilatation. If, however, such an opening is incised, they, at times, are annoyed by a downward projection of the urinary stream.

Before making a meatotomy incision a probe should be passed into the opening for a study of the obstructing tissue. Not uncommonly it will be found that the obstructing veil of tissue is above and not below the meatus and that the incision must be made in that direction or both above and below.

For the performance of a meatotomy some form of anesthesia should be used. If the tissue to be incised is very thin one often can do it painlessly after what might be called a pressure anesthesia. In order to do this, the

tissue to be incised is grasped between the thumb and forefinger and subjected for several minutes to a slowly increasing amount of pressure. This causes the intervening tissue to become so thoroughly anesthetized that the incision often causes no pain whatever. If, however, it is necessary to carry the incision well down toward the frenum it is kinder to inject some procaine or other anesthetic solution into the projected line of incision. Also, it is well to inject some of the solution into the urethra to relieve the pain caused by the passage of the sound into it.

Such incisions may be made either with a bistoury or a sharp pair of scissors. They should be kept strictly to the midline and they should make a larger opening than it is hoped to maintain, as some contraction is sure to result from healing. The urethra should be cleansed by having some mild antiseptic solution held in it and the external parts should be rendered as nearly aseptic as possible.

Some advise stitching of the cut edges but this rarely is necessary. Bleeding almost invariably can be controlled by digital pressure of the parts. It is well not to dismiss such patients from the office until they have been in the erect position for at least a half hour after the bleeding has been stopped. This is particularly so if an anesthetic containing adrenalin has been employed. It is well to place a small piece of gauze on which has been placed either carbolated vaseline or an antiseptic oil in the wound after the bleeding has stopped.

The patient or if a child, his caretaker should be instructed to stretch the cut surfaces apart widely at least twice a day until healing is complete. As this causes some slight pain it is well to have the patient return to the physician's office every other day so that he can assure himself that healing is taking place in the desired direction rather than by the adherence of the cut surfaces. At such visits it is wise to pass a full sized sound through the urethra a small distance into that canal. To do this with less pain it is well to insert an applicator containing a local anesthetic into the meatus and allow it to remain for several minutes before the passage of the sound. It, also, is wise to have such patients return for inspection at the end of three months.

**Tapping of Hydrocele**—Before any effort is made to tap a hydrocele the location of the testicle and spermatic cord should be determined most carefully. Upon extremely rare occasions there is a rotation of the structures so that the hydrocele sac lies behind the spermatic cord and, under such circumstances, the hydrocele should be tapped from the posterior aspect of the scrotum to avoid plunging the trocar through the cord. With things in their normal position as usually is the case, the trocar is passed through the scrotal wall at the junction of the middle and upper thirds of the swelling. The skin should be cleansed with soap and water and it is well to apply a good surface antiseptic at the point chosen for puncture. Because of the great sensitiveness of the scrotal skin, highly irritating solutions should not be applied widely to it.

The patient lies on his back, the mass is held with the palm of the hand under the scrotum, the hydrocele is made tense by pressure of the thumb and fingers and the trocar is pushed in until its tip is free from resistance as is shown in figure 151. It is well then to have it enter for another half

inch so that there will be no danger of the cannula's pulling through the sac wall as the cutting obturator is removed.

During the entire time that the fluid is escaping through the cannula the sac should be kept as tense as possible so as to cause all of the fluid to escape. If this pressure is released the cannula is prone to retract from the sac before it is empty and make it necessary to repeat the procedure. If all of the fluid will not escape, it usually is because there is more than one cavity and, if the trocar is then driven into the other sac without being

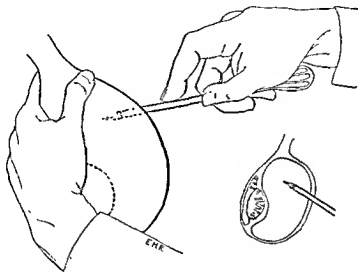


Fig. 151.—Diagram to illustrate method of holding the scrotum and trocar for tapping a hydrocele and the safe position of the cannula for the evacuation of the fluid.

withdrawn, even greater care should be exercised lest the testicle be punctured.

As the cannula is withdrawn it is well to grasp its surrounding skin with the thumb and finger and press it rather firmly together as the end is reached. This separates the layers and prevents later leakage of a few drops that usually remain. The point of puncture is then touched with the chosen germicide and no further protective dressing is required. If the cutting point of the instrument is sharp and not unnecessarily large, no anesthesia is required.



## CHAPTER VII

### DISEASES OF THE PENIS

#### MALFORMATIONS OF THE PENIS

WHILE there is a large assortment of possible penile malformations, they are, with the exception of hypospadias, so rare as to belong among the museum curiosities. They rarely are encountered in either office or dispensary practice. And, as this is not a book of urogenital curiosities, the reader, if interested, is referred to the works of A. C. Cecil of Hinman, and of Young where they have been extensively considered.

Most penile malformations cause little difficulty in diagnosis. Hermaphroditism, so called, may present difficulties in the determination of the sex of the individual but its diagnosis is made at a glance. The latter can be said with equal truth of epispadias, double penis, absent penis, concealed penis, micropenis and torsion of the penis.

Some remain as permanent deformities while some lend themselves to moderately successful surgical correction. Even that pathetic condition, pseudohermaphroditism, at times may be corrected by surgical measures to establish a vagina and perhaps, the amputation of an hypertrophied clitoris, on the one hand or the freeing of a cliteroid penis, on the other. Upon rare occasions in the adult and much more frequently in the child or adolescent, carefully administered sex hormones may aid in such correction.

#### BALANOPOSTHITIS

It is so rare that inflammation of the glans penis and the reflected layer of the prepuce do not coexist that it has become common custom to combine the terms balanitis and posthitis. In the circumcised individual balanitis, of course, may occur alone. True inflammation of the glans in the circumcised, however, is an unusual finding as the condition usually is due to the retention of irritating secretions beneath a redundant prepuce. As a matter of fact, most individuals presenting this condition have a definitely narrowed preputial opening which decidedly favors such retention. The narrowing may be a constant condition or the result of an inflammatory phimosis. Often, the prepuce cannot be retracted. There may be, and often is an associated inguinal adenitis and at times, a lymphangitis of the penis.

In studying a case of balanoposthitis the most important thing to do is to assure oneself that there are no ulcerations. It is not uncommon to find luetic or chancroidal ulcerations as the real cause of the balanoposthitis. In the presence of inflammatory phimosis where retraction of the prepuce is not possible at the first visit it is a good plan not to be stampeded into too hasty resort to such procedures as dorsal or lateral slitting of the prepuce. By the frequent immersion of the penis in hot water and the careful washing out of the preputial sac several times a day with a warm potassium

permanganate solution, one usually can reduce the swelling sufficiently to examine the parts for ulcerations and the collection of serum for dark-field study, if any are found. Where there is a definite area of induration felt beneath a prepuce which, even then, cannot be retracted, one is justified in carrying out some surgical procedure to make observation possible. Of these, cautery circumcision perhaps is best. At times this can be avoided by obtaining some fluid from the swollen inguinal lymph nodes for dark-field study. Dorsal or lateral slits in the presence of chancroid are sure to become infected and, not only are they unsightly things but they are extremely painful to the patient. The same can be said for the regular circumcision. It always becomes infected, and much subsequent destruction may result.

Smears should be made for microscopic study. In the obtaining of these smears not only should one be taken from the preputial sac, but the glans should be wiped carefully and the urethra stripped digitally to obtain smears of any urethral discharge that may be present.

The bacterial flora of most cases of balanoposthitis is of a greatly varied sort, but it, at times, gives a suggestion as to the cause of the trouble. Enormous numbers of very small gram-negative cocci and bacilli highly suggest the trouble being due to recent exposure to an irritating vaginal secretion. When due to such a cause there usually is a mild mucoid urethral discharge containing many of the same bacteria, together with some gram-positive cocci and a small gram-positive bacillus. In gonorrheal balanoposthitis one usually finds many gonococci in the urethral discharge, while the preputial discharge contains the gonococcus and quite an assortment of other bacteria. The presence of many yeast cells is highly suggestive that the individual has a marked glycosuria of long standing. A urethral discharge containing many epithelial cells and many types of bacteria, particularly gram-positive cocci, associated with a preputial discharge made up almost entirely of bacteria of all sorts, is highly indicative of urethral stricture. In deep ulcerations of the glans one should search for the fusiform bacillus and spirillum of Vincent.

**Treatment.**—The treatment of all such lesions rests in removal of the infective cause. The frequent flushing of the preputial sac with 1:5000 potassium of permanganate and the application of heat by immersion in hot water are decidedly curative in most cases. Luetic, chancroidal, herpetic and Vincent ulcerations require treatment elsewhere considered. The main consideration is drainage and the prevention of accumulating secretions. If it is possible to retract the prepuce, the structures should be washed, dried and covered with a light nonirritating dusting powder such as 1 part of boric acid to 3 of talc, several times a day. In the presence of recurring attacks or of a tight preputial opening, circumcision should be carried out during a period of freedom from inflammation.

#### PHIMOSIS

The term phimosis denotes an abnormally small opening in the prepuce preventing its retraction over the glans penis. The condition may be present at birth or acquired as the result of preputial inflammation. Congenital phimosis is by no means a rare condition and may be of such a pronounced grade as to retard or prevent urination. No one who delivers a male child

should think his work completed until he has examined the preputial meatus and taken steps to enlarge it if it cannot be retracted. Indeed there is much to be said for routine circumcision as a preventive for much penile pathology. Not only are most of the inflammatory lesions of the penis unusual in the circumcised but chancre occurs with less frequency and carcinoma is of the extremest rarity.



Fig 152 Inflammatory phimosis from gonorrhea

Almost every urologist of experience has seen much damage done to the bladder and upper urinary tract as the result of urinary back pressure caused by straining to overcome the slow urinary stream of a pin point preputial meatus. It is surprising how such an obvious cause of trouble is overlooked for a good proportion of those cases seen by the urologist are in youth and early manhood.



Fig 153 Inflammatory phimosis due to a narrowed and indurated preputial meatus

Acquired phimosis may follow any of a number of different inflammatory lesions that involve the preputial margins. It of course is rare in those individuals who start life with a normal sized opening. In others it is most common as the result of multiple chancroids or other ulcerative lesions of the preputial margins. The contraction from these or at times the swelling of the acute seizure may constrict the meatus sufficiently

to cause some obstruction to urination. Usually they make it extremely difficult to cleanse the preputial sac.

**Treatment.**—Wherever it is possible to avoid operative procedures until the acute inflammatory condition has subsided, it should be done. The dangers of wound infection are great, and considerable sloughing and skin destruction may follow. If circumcision is, for any reason, imperative during the ulcerative or inflammatory stage, it should be done by cautery. Sometimes it is best to do only a dorsal or two lateral slits, preferably with the cautery, leaving circumcision until there no longer is inflammation or infection.

The percentage of individuals with acquired phimosis who in later years develop carcinoma of the penis, while not large, is sufficient to urge the wisdom of circumcision in all such patients.

In the newborn it frequently is possible to relieve the emergency of a pin-point preputial meatus by stretching. Though this is done, it usually is wisest to do a later circumcision.

### PARAPHIMOSIS

The term paraphimosis is used to designate the condition caused by a prepuce with a narrowed meatus becoming retracted and held behind the corona glandis. The narrowing of the preputial meatus may be natural to

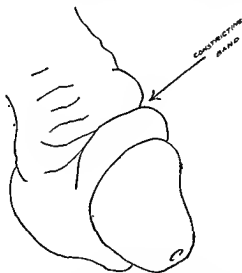


Fig. 154.—The penile deformity of paraphimosis.

the individual or it may be the result of inflammation. Most cases seen by the physician are associated with infection of some type. Occasionally, however, a case is encountered in which the patient with an abnormally small opening has failed to replace a retracted prepuce.

The inflammatory lesions most commonly causing paraphimosis are balanoposthitis, chancre, chancroid, gonorrhea and, rarely, herpes. As swelling of the prepuce takes place, there is formed a large edematous mass encircling the organ behind the corona. Across the top of this swollen cuff of tissue are several transverse creases, one of which is caused by the

preputial margin. Usually on the lower surface of the organ there is a great puffy swelling. If present for any great length of time this swelling becomes quite brawny and small ulcerations are not uncommon.



Fig 155. Gonorrheal paraphimosis. (Courtesy of Dr Paul R. Leberman.)

**Treatment**—No matter what may be the cause of paraphimosis its treatment is reduction before ulceration occurs as the result of tissue devitalization due to interference with both circulation and lymphatic return. The

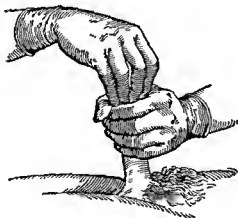


Fig 156.—The author's method of reducing paraphimosis by pressure reduction of edema in both the prepuce and glans before any effort is made to replace them in their proper relations. If the pressure is slight at first and then gradually increased the procedure causes little pain even in the presence of ulceration.

most common location of ulceration is at the cross crease on the dorsum at the site of the true preputial margin. In long standing cases small gangrenous ulcerations often are seen anterior to this point and if relief is not obtained the entire prepuce may become truly gangrenous.

By the exercise of care and patience it is rare that the prepuce cannot be replaced without resort to surgery. If, however, there is much devitalization of tissue anterior to the true constriction, or if the prepuce cannot be retracted, it is wise to cut the constriction on the dorsum of the penis. This can be done under local anesthesia.

The ease with which the swelling is decreased by manual pressure makes reduction rather an easy matter, as a rule. The method of causing this reduction is well shown in figure 156. If pressure is applied very lightly at first and then gradually increased as the patient gets more used to it, anesthesia of any type is rarely needed. The temptation to pull the prepuce forward before the swelling has been reduced in it and in the glans should be combated. It is traumatic and causes needless pain.

After the prepuce is placed in its normal position it is well to pass a narrow strip of adhesive plaster along one side of the penis, across part of the opening and down the other side. In this way one can avoid recurrence from erection. The preputial sac should be given such care as its inflammatory condition demands. Prior to reduction, however, any ulcerations should be studied carefully for *Treponema pallidum*.

#### LYMPHANGITIS OF THE PENIS

This condition is most common in gonococcal infections of individuals who have indulged in coitus or masturbation during the incubation period or the early days of the disease. It is, usually, the result of direct trauma to lymph channels already irritated by toxins from areas of infection and it is extremely rare to find it under other circumstances. The lymph vessels can be felt as narrow, cord-like indurations extending, usually, on the dorsum in the long axis of the penis. There always is an associated inguinal adenitis.

This lesion rarely is a matter of much moment. In the absence of further trauma, it almost invariably undergoes spontaneous resolution, though this may be hastened by heat. Upon the rarest of occasions small abscesses may occur along the course of the lymph channels.

#### HERPES PROGENITALIS

Herpes progenitalis is a name given to the small vesicular eruptions so commonly seen upon the skin and modified mucous membranes of the penis. They usually are in clusters and show a tendency to recur from time to time. The individual eruptions start as red, burning and itching areas upon which shortly appear vesicles. These vesicles, at first, are filled with clear serum which soon becomes turbid. The vesicle either dries into a crust, or ruptures, leaving a minute superficial ulceration. This ulceration usually goes on to prompt healing, but, if infection occurs, it may increase and cause enlargement of the inguinal lymph nodes. Suppuration of these lymph nodes has been reported but it is extremely rare.

Though usually characteristic in its appearance, genital herpes may, from infection or the application of irritating substances, assume all the appearances attributed to chancroidal ulceration. Particularly is this so when there is an associated inguinal adenitis. For which reason, there is great need that the most careful dark-field studies be resorted to before

dismissing the lesion as one of so little real importance as herpes. One should exercise great caution against viewing any penile sore too lightly as an abraded surface forms an ideal opportunity for both chancroidal and luetic contamination. A history of previous attacks is not always the safest of guides.

Often it is not possible to determine the true cause of a genital herpes. The eruption is more common in those of nervous temperament and seems to be favored by phimosis sexual excesses alcoholism balanoposthitis irritating vaginal secretions uncleanness and faulty elimination.

**Treatment**—When the lesions are proved not to harbor the *Treponema pallidum* the local application of mild antiseptic dusting powders such as 1 part of boric acid to 3 of talc usually causes them to dry and disappear. In the presence of deeper ulceration wet dressings of boric acid solution may give more comfort. Healing usually is prompt. The lesions should be protected from the friction of clothing until they have healed.

Aside from the local treatment of the lesions an effort should be made to determine their true cause and to remove it. While circumcision at times prevents further recurrences it should not be carried out with a promise of such a result as disappointment is rather commonly the patient's lot. Any local condition that is not normal should be corrected. If the attacks can be shown to be due to the irritation of vaginal secretions the patient should refrain from coitus or should wear a condom. Any associated adenitis of severity should receive the treatment advised under the heading of Inguinal Adenitis. Attention should be given to any existing nervous instability to conduct disorders and to faulty elimination.

### PENILE PAPILLOMA (Venereal Wart)

Papillomatous growths of the glans and reflected layer of the prepuce are of rather frequent occurrence. They are particularly common in men with a redundant prepuce who have had a profuse and prolonged gonorrheal discharge. For this reason they have been given the erroneous name



Fig. 157—Papillomata of the glans and reflected layer of prepuce (The so-called 'venereal warts').

of venereal warts. That this commonly is a misnomer is shown by the fact that they occur in individuals who have not had a venereal disease. They are rare in the circumcised and occur usually in those who have more than the normal amount of preputial moisture.

Papillomata of this type may be single or multiple and untreated they show a marked tendency to increase both in size and in the extent to which they cover the apposed surfaces. They begin as minute warty outgrowths

of tissue and it is only when they assume considerable size and, particularly, when exposed to air that their surfaces show a tendency to keratinize. When present in any considerable size in those with a particularly long prepuce, there generally is a foul-smelling secretion which exercises a definitely irritating influence upon the tissue. Unless grossly neglected and allowed to grow for some considerable length of time, they are benign in character. Under the latter conditions, they may undergo a malignant change, as is the case with such growths in the bladder and elsewhere.

**Treatment.**—Being due to moisture and the action of irritating secretions, they usually can be prevented by proper care of the preputial sac. During the course of gonorrhea frequent cleansing of the sac, together with dusting with some mild antiseptic powder, generally will prevent their occurrence. The same is true regarding the prevention of recurrences after such warts have been removed.

In the presence of soft warts, several applications of glacial acetic acid with a cotton applicator usually will cause them to disappear. If the growths are extensive, and hard in consistency, it often is better to carry out an electric fulguration of them after anesthetizing the penis. Upon rare occasions direct cauterization may be advisable.

If, after destruction, the papillomata show a tendency toward frequent recurrences, circumcision should be done. In fact, circumcision is one of the most valuable of prophylactic measures, but it is wise to defer it, if possible, until the warts are removed.

#### PARA-URETHRAL SINUSITIS

Infections of minute para-urethral sinuses are not so uncommon as one would suppose. Not only do these structures sometimes share in a gonococcal infection, but they apparently do not recover spontaneously from it, holding the gonococcus for months or years after the urethral infection has disappeared. As such, they are potent sources of the transference of infection. That they commonly escape detection until the patient calls attention to them or has infected others, urges the wisdom of a very careful search for such channels in every patient with a gonococcal infection.

Several years ago the writer was consulted by a young man who was accused of infecting two females. He had had many studies since a gonococcal infection eighteen months before, and repeatedly had been declared free from the disease. On very close study he was found to have a minute opening on each side of the urinary meatus from which it was easy to squeeze some secretion that contained countless gonococci. Treatment experiences with these likewise were illustrative. They were injected several times with tincture of iodine and a week after the last injection there were as many gonococci present as when first seen. The same occurred after the injection of 50 per cent silver nitrate. After a few injections of 5 per cent mild protein silver the gonococci disappeared permanently.

**Treatment.**—Unlike infections of the similarly constructed parafrenal glands, these channels do not abscess. They remain as smouldering areas of infection which clear up very promptly if one passes into them a small blunt needle through which is injected those chemicals that have a curative effect upon gonorrhea. Particularly is this true of 5 per cent mild protein



silver, and the injections should be carried out daily for several days, then every other day for three or four more treatments. Usually by this time the infection is gone, but the area should be studied repeatedly thereafter.

The older method of passing a small wire into their depths, plunging it through the urethral wall and incising it so that the abnormal channel becomes a part of the urethra is efficient but not without danger. If the urethral infection has been cleared up it is likely to recur from this later bacterial implantation. Having seen two cases of gonorrheal arthritis follow this method of cure, the writer is much in favor of the less dramatic, though slightly longer, course of procedure.

Another treatment method that has much in its favor is carried out by passing a wire to the depths of the gland and destroying it by the fulgurating current. While the plan seemingly is ideal, one cannot be altogether sure that the depths of the canal are destroyed. If this has not been accomplished and any drainage is possible in the track of the fulguration, the infection will persist.

#### CHANCROID

Perhaps the best way to describe a chancroid is not to describe it at all, for it has been proved that there are no really reliable visual characteristics whereby one safely can make a diagnosis. So many times has the diagnosis of chancroid been made from a seemingly typical sore, only to have the patient break out some weeks later with the secondary rash of syphilis, that no reliance should be placed upon the appearance of the sore itself. All too commonly, a true chancroid carries with it the *Treponema pallidum* and, just as commonly, an ulcerative chancre bears all of the supposedly distinctive characteristics of a chancroid. The only safe attitude for the physician is to view chancroid with so much doubt that he is unwilling to believe that a given sore is a chancroid until repeated dark field studies of its secretion have utterly failed to reveal the causal organism of syphilis. Even then, though he is justified in treating the local lesion as chancroidal, he should treat the patient as suspect and insist upon at least two negative Wassermann tests, the last to be made not earlier than two months after the appearance of the sore. Such an attitude regarding this lesion, that can mislead even the best of diagnosticians, is the only safe one for the physician and the patient. Countless individuals with chronic and incurable syphilis owe their conditions to that long list of differential diagnostic points between chancre and chancroid that, for years out of mind, adorned our textbooks. Thousands of lives have been sacrificed to it.

There are no true diagnostic differences except the demonstrated absence of the *Treponema pallidum* by repeated dark field studies and the fact that Wassermann test is negative and remains so for at least two months. A chancre may be the merest abrasion or the softest type of ulceration. It may be multiple, punched out, pustular or destructively ulcerative. In fact, it is only typical when indurated, and it rather seldom is markedly indurated when first seen by the physician. The incubation period of the chancroid of three to seven days, though it may be, and probably is, correct, is hardly a safe guide in these days of frequent contacts. The lesion observed may be due to a previous sexual exposure. Even if the history lacks the previous exposure it gives no assurance that syphilis was not contracted at the same time the chancroid was acquired.

Further, the development of typical chancroidal buboes does not in any sense negative an associated syphilitic infection.

Chancroid, certainly so far as the male is concerned, is truly a venereal disease, for it is doubtful if it ever occurs in him in the absence of sexual



Fig. 158.—Chancroid at the coronal sulcus.



Fig. 159.—Postcoronal chancre. (Courtesy of Dr. Paul R. Leberman.)

exposure to one having the disease. Apparently the causal microorganism is the bacillus of Ducrey.

Not only is chancroid a venereal disease but it belongs to the great "unwashed," for one seldom sees it among those who court bodily cleanliness.

The greatest enemy of its supposed causal microorganism, the bacillus of Ducrey, seems to be soap and water and it is probable that the transmission of the disease can be prevented by a careful soap and water cleansing of the male genitalia immediately after exposure. An added safeguard would be ablation with a bactericide such as a 1:2000 solution of bichloride of mercury, allowing it to dry on the parts.

**Symptoms**—The symptoms of chancroid vary in different individuals. One individual experiences excruciating and constant pain with what seems to be a minor lesion, while another has little discomfort from an ulceration of considerable size. Aside from the symptoms directly due to the ulceration itself, such as pain and discharge, the most marked ones are due to the complications which may arise. Of these complications inguinal adenitis (bubo), phimosis and paraphimosis are the most frequent.

**Treatment**—*No applications of a bactericidal nature should be applied to any penile or scrotal sore until every effort has been made to rule out syphilis.* During the course of these investigations, whether they consume one or several days, it is best to apply wet sodium chloride solution dressings and to relieve pain by immersing the part in hot salt solution from time to time and the oral administration of some pain relieving drug.

In the presence of phimosis, with a concealed sore, an effort should be made to relieve the preputial swelling by immersion of the penis in hot salt solution together with frequent flushings of the preputial sac. Failing in this, one has to consider either dorsal or bilateral slitting of the prepuce in order to uncover the ulceration for purposes of study and later treatment. Circumcision, as usually practiced should be avoided, as the wound edge is sure to become infected and much scarring may result. If it seems necessary to circumcise, as upon the rarest of occasions it does, a cautery circumcision is the method choice.

In the presence of paraphimosis, unless the condition has existed so long that sloughing seems imminent, the dark field studies should be made carefully. If these are negative, salt solution dressings should be applied until a second or perhaps a third study has been made. The chancroid then can be treated and the paraphimosis reduced as has been described elsewhere. With so painful a lesion as chancroid it may be wise to carry out an injection anesthesia of the penile shaft. With patience, judgment and gentleness in these procedures much mutilation and suffering can be avoided.

Recent medical literature contains a number of reports upon the decidedly curative action of sulfanilamide given both orally or by the direct application of the powdered drug to the ulceration. So glowing are some of these reports that one probably should try this method of treatment before resorting to others. It is said that the ulceration quickly changes its character to one with a bright red base with rapidly healing edges. This means of treatment, however, seems not to be universally successful and where it fails one must turn to the older method.

Of all of the older treatments devised for chancroids, that of Robbins and Seabury is unquestionably the most efficacious. As a rule, it transforms the lesion into a healthy healing ulceration after one or two treatments. It has only the disadvantage that it requires a high frequency electric apparatus. However, as these are available in almost every community of any size, either as regular medical equipment or in the shape of one of

the smaller so-called "violet ray" machines, this offers little inconvenience to the physician.

In the carrying out of this treatment the surface of the chancroid is covered by a cotton pledget saturated with some form of local anesthetic, borocaine, procaine, cocaine or the like, for some minutes until moderate deadening of pain sense occurs. The ulcer is then covered with 25 per cent copper sulfate solution and a fine spray of high-frequency electric sparks is passed through it from the glass "vacuum" electrode. The copper sulfate solution is reapplied several times and the electric sparking is continued until the entire ulceration is covered by a heavy, greenish-gray coat. Particular attention should be given to the chancroid edges. While any shape glass electrode may be used, one that comes to a point, particularly the so-called "ear electrode," is most convenient (Fig. 144). In the absence of such electrodes, a bare wire may be used, though such a method is much more painful and requires far better local anesthesia.

It is seldom necessary to repeat this treatment more than a few times at three- or four-day intervals. More often, a single treatment suffices. Not only does it relieve pain but it checks the spread of the chancroid and promotes rapid healing.

In the absence of high-frequency treatment, as outlined, any one of a number of other methods of treatment may be used. The application of Ziehl-Neelsen solution of carbolfuchsin, such as is used for staining the tubercle bacillus, frequently will give relief from pain for hours, check spread and promote healing. If healing does not progress satisfactorily, it generally can be promoted again by using aqueous gentian violet solution instead of carbolfuchsin. For the use of these no local anesthesia is required, since their application is painless.

Many other plans of treatment have been advised, such as mild protein silver crystals after local anesthetization, 5 per cent mercurochrome, dry electric heat, cauterization with the actual cautery after penile anesthetization, and the application of 10 per cent copper sulfate solution. The older method of applying 95 per cent carbolic solution is far inferior to any of the above mentioned. It causes great induration of the edges of the ulcer and greatly delays healing.

Perhaps the greatest tendency is to do too much of a destructive nature, and it often requires much judgment to know when to stop and give Nature a chance to repair the damage done. Particularly is this so when definitely destructive agents have been applied at frequent intervals. It often is best to cease all treatment of the sort just as soon as it is evident the ulceration is not spreading, and to substitute some nonirritating wet dressing for a few days.

Chancroids in the frenal area usually perforate it and heal with great slowness unless the remaining cord of frenum is ligated and cut.

#### EROSIVE OR GANGRENOUS BALANITIS

This type of balanitis has been termed "the fourth venereal disease," a title which is also being claimed for lymphogranuloma inguinale, though, if we are going to number them, the latter should be fifth or sixth.

Erosive balanitis is an acute, infectious, destructive disease that attacks the glans penis and is due to infection by the spirillum and fusiform bacillus of Vincent.

Being due to organisms predominantly occurring in the mouth, the lesion in question usually follows oral coitus or the placing of saliva on the glans for purposes of masturbation.

**Symptoms**—The lesions generally start as one or more shallow ulcerations covered with pus. There usually is a red zone around the ulcer edge. In most cases the ulcer deepens to the point of marked excavation. The entire glans may be destroyed as well as the prepuce. In such cases there frequently is much edema of the penile integument and the inguinal lymph nodes become swollen. There is little or no local pain but, in severe cases there may be marked constitutional symptoms such as chills, high temperature, nausea, and vomiting.

**Diagnosis**—The character of the lesion and the presence of Vincent organisms in smears from the secretion make the diagnosis simple, as a rule. Smears may be stained with almost any stain. The spirillum and fusiform bacillus are seen microscopically with ease.



Fig 160—Erosive balanitis (Courtesy of Dr Paul R. Leberman)

**Treatment**—As this disease does not occur in the circumcised, it is obvious that the first call is air, light and good drainage. Vincent's organisms are anaerobic, and the lesions produced by them are best cured by obliterating the conditions preventing oxygenation. If the prepuce is too tight for good retraction a cautery circumcision, or a dorsal or two lateral slits, are indicated in order to overcome the influencing factors.

The lesions should be cleansed and can be treated either by powdered sodium perborate, 2 per cent solution of hydrogen peroxide or potassium permanganate solution. A dressing kept wet with a solution of hydrogen peroxide is very beneficial, in both the early and subsiding stages. The application of 1:100 solution of potassium permanganate to the base of the ulcer upon one or two occasions usually will check destruction, after which either of the other two oxidizing agents mentioned promote healing and prevent recrudescences.

Sloughing tissues should be clipped loose and touched with 1:100 potassium permanganate solution, or the entire organ may be immersed in a 1:1000 solution of the same chemical.

## GRANULOMA INGUINALE

*(Granuloma Tropicum, Granuloma Venereum)*

Until the last two decades granuloma inguinale was considered to be a disease of hot climates and virtually exclusive with the Negro race. Unquestionably, the disease has existed along our eastern seaboard for many years without recognition. Simmers recognized the lesion in New York and a short time thereafter Randall, Small and Belk studied it in patients in the Philadelphia General Hospital. The disease is by no means uncommon in the southern states.

There is still much doubt about the true cause of granuloma inguinale, but there are always present within the endothelial cells small oval bodies that so closely resemble Donovan bodies that they generally are thus



Fig. 161.—Two areas of granuloma inguinale of the scrotal wall. (After Randall.)

designated. The term Donovan-like bodies is, perhaps, more appropriate. By some these are considered forms of the Friedländer bacillus. The lesions seem to be essentially venereal in origin, though the disease apparently is not highly contagious.

**Pathology.**—Starting as a small papule, which ulcerates, the disease spreads by surface extension to the surrounding regions until it becomes a large indolent ulcer with a red granular base. It may involve one or both inguinal regions, the scrotum and the penis. Often, it passes over the entire vulvar surfaces in the female and around the anus. It shows little tendency to heal, but remains for a long period of time, in the absence of treatment.

**Symptoms.**—It is really surprising how little pain and tenderness occur in the presence of such ulcerations in most cases. Occasionally, however,

nocturnal pain is a striking feature. In some cases the discharge is scanty, but added infection may make it profuse. There is little or no systemic reaction.

**Diagnosis.**—The presence of large, indolent, granulating, comparatively painless ulcers about the genitalia is highly suggestive of the condition. Diagnosis may be made positive by the finding of the Donovan-like bodies in the ulcer scrapings. To secure these it is necessary to scrape rather deeply into the tissue so that some endothelial cells are secured, as it is in them that the bodies usually are found. The ulcer surface should be cleansed, and a few drops of a local anesthetic dropped upon the area to be scraped. The scrapings are placed upon a glass slide fixed and stained with either Wright's or Giemsa stain.

Therapeutic diagnosis also may be carried out by the administration of some one of the antimony preparations cited below, since healing starts promptly upon their administration, as a rule—a tendency not to be found in other possible confusing lesions, such as, tuberculosis, gumma, chancreoid, chancre and erosive balanitis.

**Treatment.**—Following its introduction by Aragao and Vianna in 1912, antimony and potassium tartrate was extensively used by intravenous injection in 10 per cent solution.

In 1921 Randall introduced triamide of antimony thioglycollate, synthesized by Abel twelve years before, as a substitute for antimony and potassium tartrate. It proved less toxic than was the tartar emetic, and gave a more favorable therapeutic response.

In 1932 T. W. Williamson introduced fuadin for this purpose. Fuadin is a trivalent compound of antimony and sodium which is used by intramuscular injection. It is much less toxic than the above two antimony preparations and is rapid in its results. The following table from Williamson's report gives the usual dosages and the spacing of them. The drug is injected into the gluteal muscles, alternating from side to side.

TABLE 1.—COURSE OF TREATMENT ADOPTED FOR ADULTS

| Day        | Dose    | Fuadin<br>7 per cent<br>solution, c.c. |
|------------|---------|--|
| First      | First   | 15                                     |
| Second     | Second  | 35                                     |
| Third      | Third   | 50                                     |
| Fifth      | Fourth  | 50                                     |
| Seventh    | Fifth   | 50                                     |
| Ninth      | Sixth   | 50                                     |
| Eleventh   | Seventh | 50                                     |
| Thirteenth | Eighth  | 50                                     |
| Fifteenth  | Ninth   | 50                                     |
| Total      |         | 400                                    |

The writer has seen no reports upon the use of sulfanilamide for this condition. It, however, has done so many other remarkable things that it is well worth a trial before the antimony preparations are resorted to.

## LYMPHOPATHIA VENEREUM

*(Lymphogranulomatosis Inguinalis)*

This condition has been known by several names and has been considered to be a number of different diseases. Recent studies, however, have shown that these many seeming clinical entities are in reality one disease. Thus, idiopathic bubo, tropical bubo, climatic bubo, some cases of anal and perineal suppuration and fistula formation, as well as all forms of a certain type of anal and rectal stricture that formerly have been attributed to other diseases (particularly, gonorrhea, syphilis and tuberculosis) are now known to be due to this disease.

The true causal agent of lymphopathia venereum is not known but is supposed to be a filtrable virus. The disease is apparently solely venereal in origin.

**Pathology.**—The initial lesion, a small penile erosion in the male, usually has disappeared before the involvement of the inguinal lymph nodes is evident. The involvement of these lymph nodes is, for a time, discrete, so that each one seems to break down and discharge its purulent contents. Later, the nodes are matted together and the skin surface shows a number of discharging sinuses. In the male presenting no inguinal involvement there may be perineal abscess formation and rectoperineal fistulae with anal and rectal stricture, evidently due to lymph channel transference of disease. There is reason to believe that the mode of infection in such cases is anal coitus, though W. E. Coutts, of Santiago, Chile, feels that the extension must be from the posterior urethra to the perineum.

In the female, the initial lesion rarely is discovered. It is assumed that it is usually of vaginal or cervical location. The first evidence of pathology may be of the nature of anorectal stricture.

**Symptoms.**—Following an incubation period of from six to eighteen days, some type of small erosive lesion appears which is of so mild a nature that it attracts little attention. This clears up within a week or so. About the time this minute lesion is disappearing the inguinal lymph nodes become tender and swollen. The overlying skin is reddened but, as the individual nodes break down, the skin takes on a deep bluish tint. One after another of the nodes breaks down and, gradually, the entire area becomes a matted, honeycombed mass. This condition may continue for months, or even years, with much induration and scarring.

In patients whose first symptoms are perineal and anal, there appear one or more fluctuating masses in the perineum. If these are in the midregion, they are likely to be considered Cowper's abscesses. They, however, are painless and, upon rupture, a seropurulent discharge occurs and continues. In the upper perineal region these masses are likely to be confused with penile abscess or urinary extravasation; if in the anal region, they are likely to be considered to be due to anal fistula from other causes.

Some months or years later in all of the perineal cases and in females there appear marked constipation, at times, a blood-stained diarrhea, and evidences of rectal obstruction. Digital palpation reveals a hard, fibrous stricture beginning almost at the anorectal line and extending upward. In those males having marked destruction of the inguinal lymph nodes there may be elephantiasis of the penis or thigh from interference with lymphatic return.



**Diagnosis**—The diagnosis rests on the history, the lesions present, the absence of other causes, and the Frei test, which seems to be a highly specific procedure. Apparently, a positive test is confirmatory of the disease, but a few cases refuse to give a positive result to material obtained from their own lesions. These, as a rule, show a positive result when given vaccine from another proved case.

The Frei test is an intradermal test wherein material from one of the buboes is used. This material is aspirated under aseptic precautions, and diluted eight to ten times with physiologic salt solution. The diluted gland fluid is subjected to a temperature of 60° C. for two hours on the first day and for one hour on the next day. If culture proves it to be sterile, and trial shows that it does not produce a typical local reaction when injected intradermally into one not having the disease, it is ready for use.

A positive reaction is indicated by the appearance, usually by the second day, of a dark-red erythema at the site of injection. The injection usually is given in the forearm.

**Treatment.**—The therapeutic attack upon this disease has been none too brilliant in its results. There are being reported, however, encouraging results in decidedly limited groups of cases from the use of repeated courses of sulfanilamide. And there can be little doubt that it is deserving of a trial in the face of the lack of results obtained by many of the older forms of treatment.

Perhaps the best reported results have come from the employment of anthomaline. From the use of this substance Sezany, Bolgert and Joseph<sup>1</sup> reported from 50 to 60 per cent of apparent cures.

In this country the drug was used by Shaffer, Fonda and Goldberg<sup>2</sup> with about the same results. Of its mode of administration they speak as follows: "Anthomaline is administered two or three times a week, preferably the latter. The initial dose is 1 grain and the amount is increased in increments of  $\frac{1}{2}$  grain until the typical rheumatoid pains appear. This dose is usually in the neighborhood of 2 to 4 grains, but a few patients tolerate 5 grains. Usually, one course of injections total 2 to 4 grams of the drug, after which the patient is allowed a two to three weeks' rest before commencing a second and final course of treatment." It had, however, no effect upon the rectal strictures.

Others have made use of antimony in the same way that it has been used for granuloma inguinale. Some have advised the removal of the matted inguinal glands but this often is followed by edema or pseudo-elephantiasis. Irradiation has been of little avail.

#### PLASTIC INDURATION OF THE PENIS

##### (Peyronie's Disease, Plastic Penitis)

Plastic induration of the penis is characterized by the formation of plaques of fibrous tissue in the capsules of the corpora cavernosa. These areas of induration vary as to size and location in different individuals. Most commonly they are on the dorsal surface and involve the septum between the corpora, as well as their upper surfaces. Often, however, they are on the lateral surface of a corpus. While they are most usual in the

<sup>1</sup>Bull. Soc. franç. de dermat. et syph., 42, 673, 1935.

<sup>2</sup>Jour. Urol. 40, 863, 1938.

distal half of the shaft they are, at times, found at the base of the penis. With extreme rarity there may be true bone formation. The cause of the condition is unknown, although trauma at times seems to play a part.

**Symptoms.**—Aside from possible pain on erection and the curvature of the organ when erect, there are no local symptoms. Coming on usually in the middle life or beyond, it rarely causes the degree of anxiety that attends the rare case occurring in the third decade. (The writer recently saw a case in a young man of 24 years.) The patient's chief complaint is

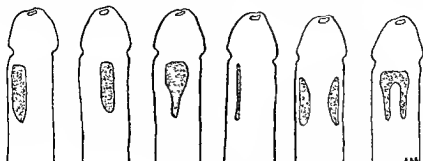


Fig. 162.—The most common shapes and locations of the fibrous plaques in plastic penitis.

that the penile curvature makes sexual intercourse either difficult or impossible.

It is a singular thing that the patient usually delays in seeking medical attention and, when seen by the physician, the condition is at its worst. So commonly is this the case that one is rather safe in telling the patient that he in all probability will get no worse. Malignant change has not been observed.

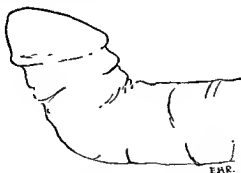


Fig. 163.—Upward curvature of the penis due to plastic penitis.

**Treatment.**—The treatment of the condition has been disappointing. Roentgen therapy has been given the credit for some cures as has also potassium iodide. Surgery should be advised with caution, for the final result is often worse than the initial condition. Herman<sup>1</sup> states that he has obtained excellent results in the arrest of the process or the disappearance of the plaque by the application of radium to the skin over the lesion. His technic is as follows: "Irradiation is applied every six weeks, the dose

<sup>1</sup> Herman, Leon: *Practice of Urology*, W. B. Saunders Co., Philadelphia, 1938.

being carried to the limit of tolerance, which in the case of the penile skin is low. Twenty to 30 milligram hours are given at each session with a total of 100 milligram hours for each square centimeter. One millimeter of platinum filtration is used. From five to six treatments are required in the average case before symptomatic relief is obtained.

### PRIAPISM

While the term priapism is used by some to include prolonged nocturnal erections, it is far more appropriate to apply it to cases of erection of much longer duration, at least, if it is not to be used with the word 'transient'. True priapism is a condition wherein the penis, in the absence of known libido, becomes tensely erect and remains so for a few days or months. It may occur almost at any age, though it is most frequent during the third and fourth decades. It is rarely accompanied by sexual desire, though intercourse is often vainly tried in the hope of bringing about its cure.

The malady may be due to a great number of things, both local and distant. It may be a result of local irritation from urethral inflammation, or of new growth. It has been known to follow the oral administration of cantharis. It also may be the result of such systemic diseases as leukemia

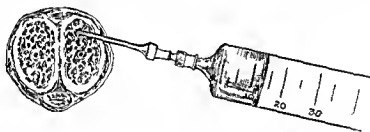


Fig 164—Method of evacuating blood and blood clot from the corpora cavernosa for the reduction of priapism. (After McKay and Colston)

malaria and tuberculosis as well as lesions of the brain and spinal cord such as syphilis, tumor and injury. Even the possibility of nasal polypi as a cause should be kept in mind.

**Symptoms**—Aside from the constant erection, there may be pain, tenderness and frequency of urination. Usually, there is some difficulty in starting the urinary stream, occasionally, however, there is complete retention. Sexual desire is rarely present. Spontaneous recovery is very rare. It is said that at least half of the patients are impotent thereafter.

**Treatment**—Though a careful study for local and systemic causes should be made in every case, it is rare that treatment of that cause brings about a subsidence of the penile erection. This is particularly true after the second day of the priapism and, according to McKay and Colston, is due to the presence of thrombosis in the corpora which, in itself, sustains erection. Thus, the relief of the symptom is dependent upon the evacuation of the blood clot. For this the above workers have suggested aspiration instead of incision. Under local anesthesia by 1-200 procaine and the most careful asepsis, they insert a number 8 Luer needle into the corpus at about the middle of the penis in the manner shown in figure 164. The contained clot is aspirated and the corpora washed with normal salt solution, which

in turn is evacuated. The intimate connection between the two sides makes it possible to do this with but one insertion of the needle. The procedure may have to be repeated later, but it is so simple that it is done easily.

Hinman advises incision into the lateral aspect of one corpus and pressing out the clot. A small rubber drain is then inserted and the wound sutured. Certainly the former method is far simpler and does not cause scar formation.

#### DISLOCATION OF THE PENIS

As the result of injury, the body of the penis may be freed entirely from its skin and forced into the scrotum, perineum or suprapubic tissues. Usually, the prepuce is torn loose at the corona glandis and the skin is only an empty sac. Cases of dislocation have been reported in obese subjects following circumcision.

**Treatment.**—If the case is seen before the tissues have become filled with extravasated blood or before the escape of any quantity of urine, it usually is possible to replace the structures. After this, the preputial tear should be sewed and the integument anchored to the penile fascia to prevent recurrence. Cases that have remained uncorrected for any great length of time all require reconstructive surgery.

#### STRANGULATION OF THE PENIS

Encircling the shaft of the penis with some restricting material may result in gangrene distal to the point of constriction. If the constriction is narrow, it is likely to cut deeply into the skin and the corpus spongiosum. Many cases have been reported wherein the practice of tying the penis with string to prevent bed-wetting or true incontinence has resulted in a deep circular cut into the penis.

The writer saw a patient who had been in the habit of applying a rubber band to the penis to improve the sensation of masturbation. Upon one occasion the band had been forgotten for some days, even though the distal portion of the organ was markedly swollen. In the depths of a circular groove, that had completely severed the urethra, was found the forgotten rubber band.

Such a constricting band should be sought in every patient presenting a cut-like ring encircling the penis. Many different types of metal rings have been found encircling the penis and many of them were removed with great difficulty.

#### FRACTURE OF THE PENIS

So-called fracture of the penis merely denotes that the fibrous covering of one or both corpora cavernosa has been ruptured.

Rupture of the tunica albuginea may occur as the result of accidental injury during coitus or from forcible efforts to "break" a chordee. The latter has occurred as the result of forcibly trying to overcome the curvature of chordee by dropping a heavy weight upon the erect organ.

**Symptoms.**—Following the rupture there is marked swelling and deformity of the organ associated with extreme pain. A large hematoma forms and, if the urethra also has been severed, urinary extravasation and infection may complicate the picture.

**Diagnosis**—The history of injury and the feeling of the tear in the tunica albuginea leaves little doubt, if the case is seen early. If seen late, the secondary conditions of urinary extravasation and infection may obscure the "fracture" until it is discovered at operation.

**Treatment**—This depends entirely upon the extent of the rupture and other complicating factors. In the lesser grades it may be necessary only to put the organ in a splint, cause traction by carefully applied adhesive tape to prevent deformity and apply cold applications. If the rupture is extensive or if there is urinary extravasation the treatment is surgical.

### CARCINOMA OF THE PENIS

Epithelioma is the most common type of malignant growth of the penis. Although it is a disease largely confined to later life, a few cases have been reported earlier, one at eighteen years.

**Etiology**.—The most frequent etiologic factor is phimosis favoring retained secretions and a chronic balanoposthitis. Penile carcinoma rarely, if ever, occurs in the circumcised. Many penile carcinomata have been reported as occurring at the site of the scars of former injuries or ulcerations. Neglected "venereal warts" show a tendency to undergo malignant change. Carcinomata of the penis, in almost all instances, start on either the glans or reflected layer of the prepuce, and are either of a vegetating or an ulcerating type. Either of these lesions, small at first, are refractory to treatment, recurring repeatedly after seeming destruction. They gradually increase in size, penetrate Buck's fascia and metastasize either to the inguinal lymph nodes, the deep pelvic nodes or both. There may be great granular masses of growth or, as in the ulcerative type, much tissue destruction. Even the former, however, may show much devitalization of tissue as the result of sloughing.

**Symptoms**—The earlier stages of penile carcinoma are practically painless in most cases and it is surprising how extensive are most of the growths when first seen by the physician. Many, however, have received much treatment, either by the patient or his physician, under the impression that they were relatively unimportant conditions due to the phimosis.

During the more advanced stages there frequently is intense pain and, later still, if cure is not obtained, the cachexia and exhaustion of metastasis take place.

**Diagnosis**—Any chronic inflammatory condition of the preputial sac that is associated with either warty formations or surface denudations, particularly after the age of thirty-five, should be viewed with definite suspicion. Any lesion that is in any way refractory to treatments appropriate to nonmalignant penile lesions should be deemed doubly suspicious. In both biopsy should be performed rather than allow the least doubt to persist. The absence of palpable lymph node involvement is of no negative value in early carcinomatous lesions, for such metastasis usually is a rather late manifestation.

Chancres rarely is of sufficient duration to offer a confusing element and chancroid should, as a rule, give little difficulty in diagnosis. Chancroids that have been treated by strong chemical cauterization sometimes suggest the indolent type of epithelioma both as to appearance and as to refractoriness to treatment.

Little difficulty is encountered in the correct diagnosis of advanced penile cancer with lymph node involvement though, even here, biopsy is of importance.

**Treatment.**—The treatment of penile carcinoma is largely a question of the condition present when the diagnosis is made. In the presence of small growths with no evidence of metastasis, Dean and his co-workers advise irradiation. Others feel that both irradiation and surgical removal should be used in all cases, the irradiation both preceding and following operation. As to the extent of the operation, conditions present add some controlling factors. For small unmetastasized growths amputation 2 to 3 cm. proximal to the involved area is deemed sufficient by some, while others advise total amputation. In the presence of marked lymph node involvement, extirpation of the penis as well as of the lymph nodes is advised.

All cases should be given periodic irradiation for some time after seeming cure by one means or another. Also, metastases should be closely watched for throughout the remaining life of the individual.

#### SARCOMA OF THE PENIS

Sarcoma of the penis is a very rare condition. It is found in younger individuals than is carcinoma, as a rule. Starting as a nodular mass in the erectile portion of the penis, it grows very rapidly in most cases and metastasizes to the lymph nodes early. Occasionally it grows rather slowly and shows late metastasis.

Because of its location and size there may be urethral obstruction, with urinary retention and priapism.

The diagnosis is made solely by biopsy, the growth generally being assumed to be something else until this is done.

The treatment is extirpation of the penis and irradiation. The prognosis is of the most gloomy nature.

#### TUBERCULOSIS OF THE PENIS

Tuberculous infection of the penis is of decidedly rare occurrence today. In previous years when it was the custom to check bleeding in the circumcision of infants by placing the penis in the mouth filled with wine it occurred with greater frequency. In the infant it is a highly fatal condition unless checked very early. Even in the adult it carries much danger aside from its local destructive action.

Tuberculosis should be suspected following circumcision in all infants if areas of granulation appear in the wound edge and rapidly increase. In such cases the disease runs a decidedly rapid course. There is involvement of the inguinal lymph nodes, usually within a few weeks, and miliary dissemination is by no means rare.

In the adult the lesion takes a slowly destructive form, as a rule, healing in some areas and breaking down in others. At times, the corpora cavernosa and corpus spongiosum become involved. Sinus formation is not uncommon. There usually is some enlargement of the inguinal lymph nodes.

**Pathology.**—The disease may start by the occurrence of hard nodules in the deeper structures of the penis. These usually break on the skin surface and continue as discharging sinuses or they may cause large granu-

lomatous areas. Again the lesion may take its first appearance as either a granulating lesion or an ulceration of the skin or glans penis. Tubercle bacilli can be found in the tissues and, occasionally, in the discharge from the lesion. In children lymph node and commonly systemic involvement occur early. In the adult there may be little or no involvement of the inguinal lymph nodes and systemic infection occurs slowly, if at all.

**Diagnosis**—The disease in the adult most commonly is confused with carcinoma. It usually occurs at an age wherein carcinoma is unlikely. It is to be differentiated by the presence of tubercle bacilli in the exuding fluids or by biopsy. From chancre it is differentiated by dark field study, Wassermann test and its failure to heal under antiluetic treatment. The



Fig. 163 Tuberculous lesion of the glans penis and prepuce (Courtesy of Dr Paul R. Leberman)

ulcerative type may be confused with chancroid. Its failure to heal as the result of sulfanilamide administration or the Robbins and Seabury method of fulguration and the absence of the Ducrey bacillus, together with the finding of tubercle bacilli, usually make it possible to arrive at a proper diagnosis.

**Treatment**—If destruction is not excessive some cases can be cured by the extirpation of the lesions either by means of fulguration or the actual cautery. For the more extensive lesions Herman advises sunlight, x ray therapy and the Finsen light. Hinman urges early extirpation, while most others view surgery as a last resort and one of no great promise in most cases.

## CHAPTER VIII

### DISEASES OF THE URETHRA

#### URETHRAL MALFORMATIONS

FAULTS in the developmental course of the urethra are by no means uncommon. They are of so many varieties as almost to defy description, as would be expected from the many possibilities offered during the embryonal differentiation of the sexes. Those malformations that are of most frequent occurrence, or of most importance to the patient, are the ones most deserving of consideration here. To describe, or to enumerate, that vast assortment of accessory channels that occur in association with this canal, many of which are so rare as to be seen by few, is to multiply words to little point.

**Hypospadias.**—Unquestionably, hypospadias is the most frequent of all urethral anomalies, though it is seldom of as much importance to the individual as are some of the others. The most common form has the urethral opening where the frenum should be, or slightly posterior to that point. This structural fault, except for the fact that the external opening rather commonly is contracted, gives the patient no difficulty and needs no treatment. The urinary stream is projected forward almost as though the urethra did penetrate the glans penis and procreation is in no way interfered with. In such patients there usually is a shallow depression in the furrow on the under surface of the glans, in front of the opening of the urethra, which sometimes leads into what is virtually a paraurethral sinus of considerable length. This is of importance only in the presence of gonococcal infection, as it furnishes an ideal structure for the colonization of gonococci long after the urethral infection has subsided. Another point to be remembered is that the glands on the exposed mucous membrane are likely to have their openings so traumatized by treatment efforts to combat that disease, that they can drain only intermittently and, thus, can hold gonococcal infections for an indefinite period. They should be searched for carefully before such a patient is pronounced cured.

Second degree hypospadias, that type wherein the urethra opens at the penoscrotal angle, fortunately is a rare condition. Though the patient, as in all forms of hypospadias, has full sphincteric control of the act of urination, he often has so much difficulty in controlling the direction of the stream that he demands operation for its correction. The same is true of those with the urethral opening in the perineum, third degree hypospadias. Having to sit down to urinate offers no great appeal for them, nor have the gibes of their companions, if their necessity is discovered. While procreation is not necessarily prevented in the other two varieties it is rendered impossible in cases with a perineal opening, except, perhaps, by means of artificial insemination.

Operations for hypospadias often are far from being brilliant successes, and it is best not to speak of them in too glowing terms to the patient. If



there is an associated penile curvature preventing intromission it should be corrected by operation. As Keyes says, 'The results of operation for incurvation are as generally successful as those for repair of the urethra are

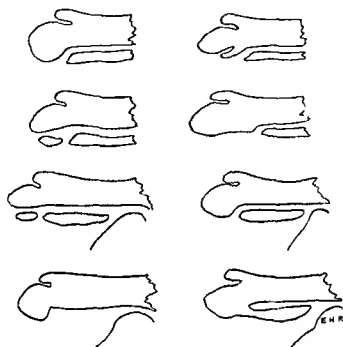


Fig 166—Outlines of the various types of hypospadias (After Kaufman)

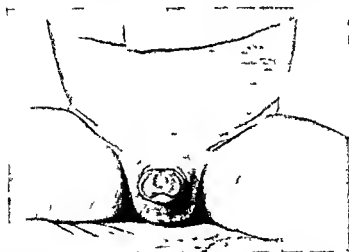


Fig 167—Epispadias in an infant (Herman The Practice of Urology, W B Saunders Co., Philadelphia)

unsuccessful." Where it is possible, such operations should be done before the child is five years of age.

**Epispadias**—This far less frequent malformation is one of life's most pathetic developmental failures. The urinary opening may be on the dorsal

surface of the glans penis and if so there may be some sphincteric control. More commonly the opening is on the dorsal aspect at or near the base of the organ. In both of these latter varieties there is no sphincteric control, the canal passing anterior to the prostate and not through it. There may be a lack of fusion of the pubic bones and the penis is markedly deformed.

Operative procedures are rarely successful and usually the patient does better to beat his misfortune as best he can. In a few cases urinary control has been obtained by plastic surgery.

### GONORRHEA

Gonorrhea is a disease caused by the penetration of tissue surfaces by the gonococcus. Predominantly, it is a mucous membrane disease and shows a decided predilection for tissues of the urogenital tract and the infant conjunctiva. It exerts most of its influence upon mucous membranes covered by columnar cells. Those covered by transitional epithelial cells seem equally as vulnerable where the mucous membrane is firmly attached to its subjacent structures. These, however, rarely hold the infection for as long periods of time as do those covered by columnar cells. Squamous-celled surfaces are practically immune to the infection unless they are irritated in such a way that their surfaces become denuded or devitalized.

**The Gonococcus.**—The gonococcus is a member of the bacterial group *Neisseriae* and, together with the other members of this group, it is a diplococcus that invariably is gram-negative in its staining reactions. It presents no gram-positive members. It usually is found in the polymorphonuclear leukocyte in the discharge from the disease. Unlike the staphylococcus and most other organisms, it is not digested by the pus cell, so that it stains deeply and evenly as long as it remains in the cell. In fact, it does this extracellularly, also, up to the time of bacteriolysis.

The gonococcus is differentiated with some difficulty from other members of the *Neissetiae*. The two with which it is most easily confused are the meningococcus and the *Micrococcus catarrhalis*. The former, however, is seldom, if ever, found in the sites elected by the gonococcus in the human body, and the latter seldom, if ever, is taken up by the leukocyte; usually it is a smaller bacterium. They are readily differentiated if obtained in pure culture, as they show different fermentative reactions and differing degrees of alkali solubility. It is safe to assume, and the courts usually accept such an assumption, that a gram-negative intracellular diplococcus of the size and shape of the gonococcus found in pus from a mucous membrane, particularly from the urogenital tract, is the gonococcus. With the more general use of cultural methods it is probable that medicolegal circles may become more exacting in this regard before very long. The same degree of assurance can not be held about extracellular diplococci.

Gonococci never can be differentiated safely from the diplococcal forms of the staphylococcus and the streptococcus without the use of the Gram staining method. As these are found in almost every urogenital tract, it is obvious that no other staining method can be relied upon for safe diagnosis.

The more recently devised cultural methods, particularly those of Carpenter and his co-workers, have added much to our ability to make a

diagnosis of gonorrhea. For in their hands the percentage of positive findings outnumbers that demonstrated by smears alone. In infections of the female this is a decided advance, and it is hoped that the rather complicated

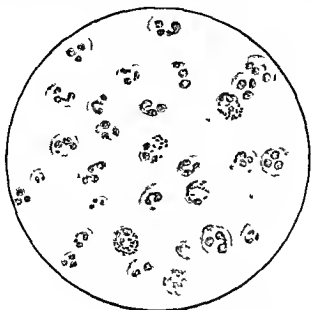


Fig 168 Intracellularly located gonococci

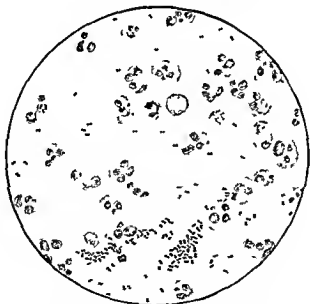


Fig 169—Extracellularly located gonococci

technic will not deter our other laboratory workers from making it generally available.

**Pathology.**—The gonococci penetrate between the surface cells and find their way deep into the submucosal areas. Here, they complete their life cycle, disintegrate and liberate an endotoxin of a highly irritative sort.





Fig. 170.—Drawing from a histologic section of an acute gonorrheal urethra. It has been shown that the gonococci penetrated far below the basement membrane and that wherever there were gonococci in the deeper tissues there were polymorphonuclear leukocytes, so that the presence of one indicated the presence of the other. Such being the case it is interesting to note to what great depths gonococci penetrate. One cannot study such a section closely and find much to support the idea that our urethral injections of bactericides cure gonorrhea because of their direct bactericidal action.

meatus and burning on urination followed by the appearance of urethral discharge. In a number of patients there is but the slightest urethral discomfort and a very scanty discharge. The severest early symptoms usually occur in those patients who consume much alcohol or indulge in intercourse during the incubation period.

If the urethral inflammation is severe, as is frequently the case in patients who continue either coitus or alcohol during the first days of the disease, there is much infiltration of the corpus spongiosum, causing great pain on erection and, perhaps, marked penile curvature, chordee.

After a few days in those patients in whom the disease is subsiding in activity, the urethral discomfort disappears and the discharge gradually decreases in quantity and finally disappears.

Should the infection pass beyond the bulbomembranous junction and involve the posterior portion of the urethra there usually is marked vesical discomfort and frequency of urination lasting two or more days and gradually subsiding. Here, again, there may be almost no subjective symptoms to suggest such disease extension. Particularly is this true in well-behaved patients who have been receiving some nonirritating form of local treatment. So mild may be these symptoms that, unless the physician is closely watching the patient's urine as it is being voided into two glasses, the extension may not be discovered and the patient may be treated solely for anterior urethritis and discharged as cured when, in reality, he has a gonorrheal infection of his prostate gland.

Upon even rarer occasions, posterior disease extension does not make any change whatever in the urinary picture. In such patients it is usual for the supposed anterior urethritis to run an erratic course. This arouses the physician's suspicion and, upon obtaining the prostatic secretion he finds, to his surprise, pus and gonococci.

Occasionally, in severe cases or those subjected to local trauma, the prostatic infection that always complicates posterior urethral infection causes great swelling of the gland associated with rectal discomfort. There may be difficulty in starting the stream, blood at the end of urination, and elevation of temperature. Under these circumstances, there always is a high leukocyte count which is prone to arouse the suspicion of prostatic abscess. The leukocytosis usually persists for days or weeks after the acute prostatic swelling has subsided.

During the presence of anterior urethritis alone, the urine, if passed into two glasses, shows a haziness or cloudiness of the first glass with a perfectly clear second glass. With the onset of acute posterior infection as a rule, the second glass of voided urine also becomes cloudy. When the posterior infection subsides, so that there is not sufficient pus formed in the posterior urethra between urinations to force its way into the bladder and cloud its contents the urine picture reverts to that seen in anterior urethritis, wherein the first glass of urine is soiled and the second is clear.

When active suppuration ceases shreds, instead of free pus, are seen in the first glass of urine and, if the treatment is not irritating, these gradually disappear and both glasses of urine become clear. However, it should be remembered that this clearing of the urine takes place long before the gonococcus has been eradicated, and it is in no sense a criterion of cure, nor does it urge immediate cessation of treatment.

*To Follow the Course of the Disease (Two-glass Test).—*Unquestionably, the simplest and surest way to follow the course of gonorrhea from the beginning to the time of latency wherein the urine becomes clear, is by means of the two-glass test. Particularly is this so if the urinary picture is

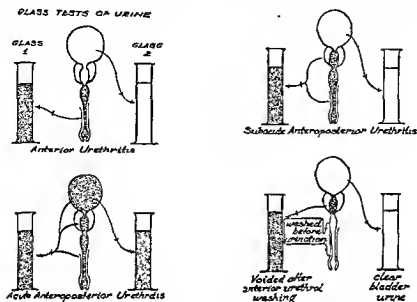
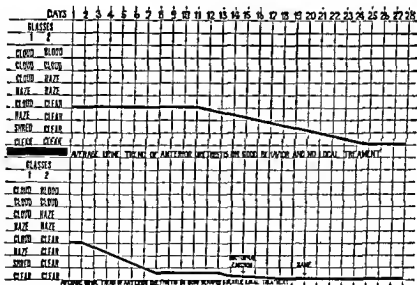


CHART II

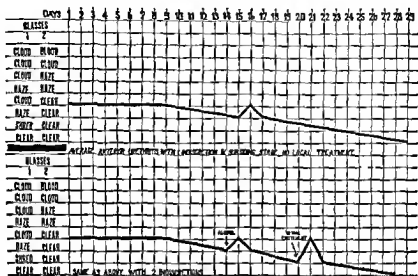


charted as one would chart a patient's temperature. For this purpose the writer for some years has utilized such charts in the teaching of his students and finds that they convey the idea to them much better than does a lengthy discourse upon the subject of clinical course. The interpretation

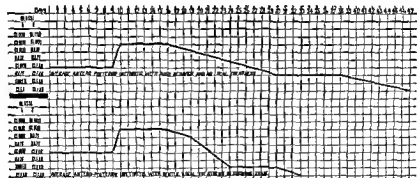
of the numerous variations in this test has been covered in the section upon diagnostic methods and one familiar with the causes of these changes should be able to learn much from the following tracings of urine trends

In chart II we see the urine trends of two cases of gonorrhea. The first had no local treatment. It will be noted that although his first glass of urine remained cloudy for eleven days the infection did not enter his posterior urethra. On the twelfth day the urine started steadily to clear

### CHART III



#### CHART IV



becoming crystalline on the twenty fifth day of the disease. The charted lines are straight ones and bespeak perfect patient cooperation.

In the second case local treatment was used. It brought about a prompt curative response so that the urine was crystalline on the seventeenth day. On the fourteenth and nineteenth nights he had a nocturnal emission without any change in the appearance of his urine as would have been the case if there were any infection of his seminal vesicles.

In chart III we see the urine trends of two more cases of anterior urethral infection. In the charted lines of decline there are breaks caused by all advised behavior. That in the first case is not stated but in the



second there were transient toxin responses, one to alcohol and the other to sexual excitement.

In chart IV we see the urine trends of two patients who developed a posterior urethral infection. In the first we note the long line of decline so common to patients receiving no local treatment. In the second case we see his line greatly shortened by local treatment. Both show good patient cooperation.

CHART V

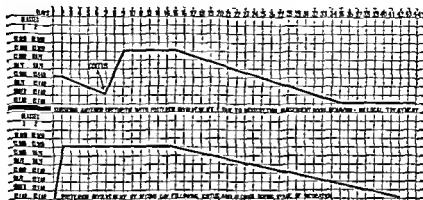


CHART VI



CHART VII

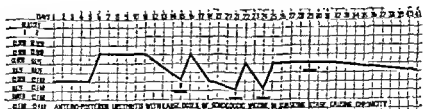


Chart VII.—The urine trends of patients receiving large doses of gonococcal vaccines commonly follow a course much like the above.

In the first case in chart V we note good curative response being terminated by sexual intercourse which was followed immediately by posterior urethral extension. In the second case we see almost immediate posterior urethral extension as the result of alcohol and sexual intercourse toward the end of the period of incubation.

In chart VI we see the typical trend of a patient who developed an epididymal extension on his fourteenth day.

# CHART VIII

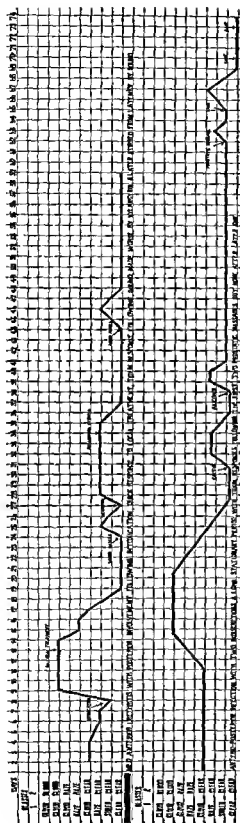


Chart VIII.—In the first case we see an individual with good resistive powers becoming intoxicated in the subsiding stage of an anterior infection and immediately developing posterior involvement. On the thirteenth day of his disease he received an intravesical irrigation of potassium permanganate. The response to this treatment was so prompt as almost to prove that his misconduct occasioned his posterior extension. On the twenty-fourth day of the disease his physician unwisely passed a urethral sound and occasioned a marked toxin response. When this subsided the patient was given 10 per cent argyrol injections. The change in the urine trend gives ample evidence that this solution was too strong, for discontinuing it caused a prompt clearing of the urine. On the forty-fourth day the physician again tried a sound and caused a recrudescence of discharge. After this both the patient and the physician behaved, and the former had a chance to get well.

In the second case we see an average anteroposterior curve with two later toxin responses from *musconduct*, and two much later ones from the first two prostatic strokeings, but none after the subsequent ones (These histories were kindly loaned by an urologist who, for obvious reasons, is not credited by name.)

**Prophylaxis.**—The prevention of gonorrhea is one of the most important of public health measures. Its three most important phases are: 1, avoidance of infective contacts; 2, use of true prophylactic measures; 3, control of infected patients until cured. From a medical standpoint the

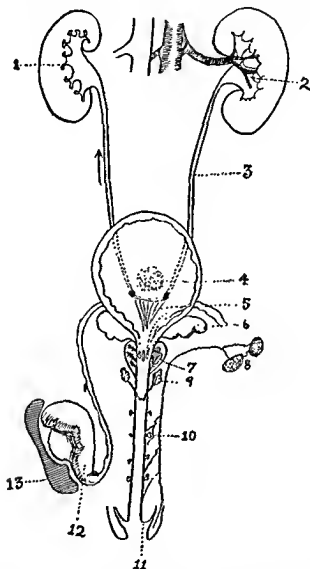


Fig. 172.—Urogenital sites of extension of urethral infection by the gonococcus. (Diagrammatic, after Leguen and Papin.) 1, Nephritis. 2, Pyelitis. 3, Ureteritis. 4, Cystitis. 5, Trigonitis. 6, Seminal vesiculitis. 7, Prostatitis. 8, Inguinal adenitis (bubo). 9, Cowperitis. 10, Folliculitis. 11, Balanoposthitis. 12, Epididymitis. 13, Inflammatory hydrocele.

first merges into the third and both urge the necessity for frequent contacts between physician and patient to the end that the latter is sufficiently impressed with the gravity of the disease to remain under treatment until he is cured. And, as we have no real proofs of cure, he should be instructed

to use a condom for at least three months after he is thought to be cured. By so doing he will avoid infecting others if he really is not cured.

Aside from continence, the careful use of a good rubber condom unquestionably offers greater protection against both gonorrhea and syphilis than is afforded by chemical measures after exposure. A short time ago these devices ran almost as high as 70 per cent imperfect. During the last few years certain standards have been set up by the Food and Drugs Administration that have eventuated in a great improvement in the quality of condoms so that imperfect ones seldom comprise 10 per cent of those offered for sale. This is a marked improvement but it has not reached the point where each one does not need to be inflated before use in search of breaks in surface.

Condoms should be removed carefully and the hands and external genitalia should be carefully washed with soap and water. In the absence of such washing gonorrheal infection is not rare despite the use of the protector.

Regarding the value of the use of chemical germicides as prophylaxis against infection, there can be no doubt, and patients should be instructed as to this value. Their value decreases as the time interval between the sex contact and their use increases. Within the first two hours, before the gonococcus has had time to penetrate among the epithelial cells, they are perhaps 90 or more per cent efficient in their action if properly used, and they should be tried on those patients who represent themselves even after a lapse of twenty-four hours.

For prophylaxis it is customary to use solutions about twice as strong as should be used for the treatment of gonorrhea. With mild protein silver this should be 10 per cent, while with strong protein silver or mercurochrome it should be 2 per cent, with acriflavine 1:2000 and with permanganate of potash it should be 1:3000.

To carry out such prophylaxis the patient should pass urine, gently balloon the urethra with the chosen substance and hold it in for at least five minutes. He should be warned to disregard any discharge that appears within twelve hours of such chemical injections as they not infrequently occasion a slight and transient chemical urethritis.

As a prophylaxis against syphilis he should be instructed to anoint the entire penis and scrotum with 30 per cent calomel ointment, which should be left on for some hours. Just how efficacious this is may be a moot question in the light of the work of Mahoney on rabbits, but it is a wise procedure to adhere to until science furnishes something better.

Treatment.—The advent of sulfanilamide into the treatment of gonorrhea caused revolutionary changes in many of our views regarding the outlook of those infected. As has occurred with almost every new method of treatment for this disease, the medical profession was treated to an enormous amount of rather poorly based "science," which, for a time, did perhaps as much harm as good. It was told by those in whose writings it had come to place much credence that this particular drug would cure from 50 to even 90 per cent of all patients with gonorrhea. Those in general practice, believing what they had been told, immediately started to prescribe sulfanilamide and to assume, as had many of their mentors, that those patients whose symptoms were banished were really cured. The

pharmacists, not to be outdone, suddenly became authorities upon the treatment of gonorrhea and the chase was on. And, as one looks back upon what happened, he cannot escape the conviction that we would make no mistake if he let it go down in medical history as "The Great Sulfanilamide Fiasco."

The inquiring mind naturally wonders just why all of this came to take place and it can find but one answer. To an overwhelming extent the papers that appeared early were written by urologists whose minds had dwelt in the upper reaches of that ethereal zone where patients donate to science such things as kidneys, prostate glands, and those other things that so often find a resting place in museum jars. They for years had looked with something akin to contempt upon this lowly disease and, apparently, they had forgotten much about it that would have prevented their deceiving themselves and others. They gave sulfanilamide, used local treatment and watched. If the patient became symptom-free or apparently cured in almost any old time he was considered to have been cured by the sulfanilamide he once had taken. In other words, they took drug cures, local treatment cures and time-element cures and called them all "sulfanilamide cures." Just how much harm resulted from this no one will ever know. That it must have been great is sensed from the fact that later studies have shown that the real cure rate of this drug alone is around 18 per cent. This can be raised to 30 per cent by concurrently used local treatment. Among the 70 per cent not cured are to be found approximately 30 per cent of asymptomatic gonococcus carriers and, perhaps, 40 per cent of definite failures that should deceive no one.

The turning loose upon an unsuspecting public of so many patients who thought they were cured was a menace to the public health that requires no comment. If to this we add the fact that most, if not all, of those infected by this vast army, became totally asymptomatic gonococcus carriers, we only make the picture more somber. The fact that those infected by these secondary carriers were the victims of frank gonorrhea just means a lot of surprises that only serve to make the disease seem even more mysterious than it really is. It merely demonstrates what our bacteriologists have known for years, viz.: If an attenuated germ is passed through an animal it regains its virulence and becomes an active infecting agent for the next animal.

There is comfort and safety in the fact that this may have been our last wholesale fiasco, so far as new drugs are concerned. But it will do us little good to regret that the Food and Drug Act came into force about two years too late to have spared us this one. We can take comfort in the fact that our newer sulfonamides, sulfapyridine and sulfathiazole, are as good as we were told by the most enthusiastic that sulfanilamide was. Those who have most intelligently studied the question now insist that sulfanilamide has no place in the treatment of this disease and that it should not be used. The misfortune here is the difficulty in removing from the treatment of a disease any drug that has been so highly vaunted, no matter how faulty were the claims. It is probable that for some years to come there will still be those who continue to prescribe this drug.

Leaving sulfanilamide as a decidedly broken crutch, where do we stand? The answer is that we stand on better ground than any one ever dreamed we could. And, though there may be other sulfonamide drugs yet to appear

on the market for the treatment of gonorrhea, they must be effective, in deed, to displace sulfathiazole and sulfapyridine. At least two now being used experimentally, *sulfadiazine* and *sulfhydrothiazole*, look promising as possible competitors but, so far, there is little to suggest that they will get the field to themselves. Wherefore, we seem for the time to have reached at least a temporary resting point that does not require a loose-leaf book to keep us up to date.

The present trend is to consider *sulfathiazole* the drug of choice. This is not because its apparent cure rate is higher than that obtainable from sulfapyridine but solely because its extremely low toxicity incidence makes it a safe drug for the treatment of ambulatory patients. Both of these drugs have been previously discussed in the section on General Treatment Methods and we here can confine our thoughts to the clinical aspects of their use.

In the employment of any of the sulfonamide drugs in the treatment of gonorrhea there are a number of things that should be in the mind of him who prescribes them. Of them it can be said that they do one of three things, viz

- 1 They promptly produce a state of cure,
- 2 They produce an asymptomatic gonococcus carrier state, or
- 3 They exert no change whatever.

The latest appraisal of the use of these two drugs by the Cooperative Group for the Study of Gonorrhea appointed by the United States Public Health Service has shown that both these drugs have an apparent cure rate of 70 per cent, a clinical relapse rate of around 7 per cent, an undetermined asymptomatic carrier rate that is decidedly low and an encouragingly low definite failure rate. From this it would appear that we have it in our power to eradicate quickly 70 per cent or more of all infections by a decidedly short period of medication. So far as the amount of drug giving the best curative results is concerned, it was evident that this fell somewhere between 20 and 25 gm for a course of medication. Reviewing the dosage schemes employed by various investigators it is found that about equal results were obtained by the following

| Days  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-------|---|---|---|---|---|---|---|---|---|
| Grams | 4 | 4 | 4 | 4 | 4 |   |   |   |   |
| Grams | 3 | 3 | 3 | 3 | 3 | 3 | 3 |   |   |
| Grams | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 |

In planning a scheme of treatment for a given patient it is evident that less misunderstanding would occur if the first schemes were followed. Where a changing dosage is employed, confusion can be avoided by furnishing the patient with written instructions. One thing upon which practically all investigators agree is that further medication at the time is useless in those patients who are not entirely symptom free at the end of five days. That this drug's refractoriness is not always a constant condition in a given patient is shown by the fact that a second or, even a third course of treatment after rest periods of one or two weeks not uncommonly proves effective. It also has been shown that most sulfapyridine failures are favorably influenced by sulfathiazole but there is little to suggest that the reverse is true.

Where definite failure is registered, as well as in the presence of a proved

carrier state, one should resort to local treatment, as previously has been described, or a combination of sulfathiazole and fever.

The clinically arresting feature of this entire problem is the possibility of the production of a carrier state. Unfortunately our tests of cure, other than repeated cultural studies, as outlined elsewhere, are of little value, for such patients often can indulge repeatedly in those things that were so potent in revealing hidden infection in presulfonamide days. Alcohol, sexual excitement, and even sexual intercourse commonly fail to produce the slightest suggestion of symptomatic recurrence. Such a combination of circumstances gives little comfort to him who dreads the passing back into social activity of patients still infected. And he who works up too comforting a degree of assurance about cure even in culturally negative patients may have much to regret. In the above mentioned survey it was not altogether rare to find a positive culture following one or more negative ones. In other words, no one really knows when any patient is cured, for which reason, the careful physician will absolutely insist that no patient indulge in sexual intercourse for several months without the use of a condom proved to be good by forcible inflation. Of course, many patients will fail to follow the instructions, but those who do not cannot blame the physician for any disasters that may eventuate.

He who employs either of these better drugs, sulfathiazole or sulfapyridine, for the treatment of gonorrhea does well to bear constantly in mind the fact that there commonly is a decided difference between the disappearance of symptoms and actual cure. He should also concentrate upon the fact that the actual cure rate, so far as it can be determined by culture and clinical study, rests somewhere between 70 and 80 per cent. With these things ever present in the mind it is of interest to analyze the study made by the Cooperative Clinical Group and the United States Public Health Service<sup>1</sup> on dispensary patients.

Considering first the comparative speed with which these two drugs banished all symptoms it was found that by the end of two weeks this had occurred in about 87 per cent of those patients taking sulfathiazole as against about 76 per cent of those taking sulfapyridine. By the end of five weeks the percentage of symptom-free cases on each drug was the same, about 96 per cent.

Comparing these two drugs from the standpoint of their cumulative apparent cure rates, as suggested by negative cultures, it appears that they both are almost the same. At the end of three weeks each showed an apparent cure rate around 58 per cent which, by the end of five weeks, had risen to about 82 per cent.

A comparison also was made regarding the percentages of apparent cure rates in those patients who previously had failed to respond to another sulfonamide—usually sulfanilamide. In this respect sulfathiazole was far superior to sulfapyridine. By the end of a five weeks period after the drugs were started sulfathiazole had registered around 83 per cent of apparent cures while sulfapyridine had only reached the 40 per cent mark.

An effort was made to determine the comparative values of different

<sup>1</sup> This report was presented June 2, 1941 before the American Neisserian Medical Society and will appear in the *Journal of Syphilis, Gonorrhea and the Venereal Diseases*.

dosages These were divided into three general groups as follows Group I, those receiving between 90 and 199 grains of the given drug, Group II, those receiving between 199 and 299 grains, and Group III, those receiving 300 to 399 grains While all produced about an equal number of symptom free patients on each drug by the end of a five weeks period there was a decided difference in the intervening period By the end of the second week 83 per cent of the sulfathiazole patients were symptom-free as against 76 per cent of those taking sulfapyridine By the end of the five weeks period in the sulfathiazole cases there was a slight difference in favor of Group III over those on the lower dosages, as well as those upon sulfapyridine (about 5 per cent) The number of sulfapyridine symptom free cases varied from week to week but for each group the platted lines all met at the end of five weeks In other words, sulfathiazole on the larger dosage was more speedily effective in the early banishment of symptoms than was sulfapyridine and in its result at the end of the five weeks period

Reverting to those who fail of curative benefit from either of these drugs it is an unfortunate circumstance that a large percentage of them are rendered symptom-free And it often is an exceedingly different task to locate the residual focus of infection Obviously it seldom is in the seminal vesicles It is rather commonly in the prostate and, from the number of chronic Cowper's gland infections the writer has encountered among such patients, he feels them deserving of the utmost care in study The same apparently applies to Bartholin's glands

*Dispensary Patients*—As upwards of 75 per cent of such patients disappear from treatment while they still have the disease, anything that can cure quickly even a small percentage of them has untold value as a public health measure It is, for this reason, suggested that they all be placed upon a sulfonamide As the use of some form of local treatment in these patients has proved to have valuable case-holding qualities they also should have it Aside from this consideration it does much to control or cure the disease in drug failures

*Office Patients*—Here we find a far more cooperative type of patient Usually he realizes the possible seriousness of his disease to himself and others and is imbued with a great desire to get well Almost invariably, he trusts his doctor and, if the latter uses the proper mental approach, he can be kept under treatment to the point of cure Efforts toward the protection of others do not occupy so large a part of the clinical picture, for it is rare that he will expose them during the time his infection persists Thus, in office patients, one safely can vary his methods to suit existing conditions Even though there, at times, may be social considerations wherein the need for a speedy cure seems uppermost, he seldom, if ever, need allow himself to be crowded into a haste that, in the end, may not be a safe time-saver

It is therefore suggested that those patients seen before the sixth day of the disease and in whom posterior urethral infection has not occurred, be placed upon local treatment alone and given no sulfanilamide unless posterior infection becomes imminent or occurs The duration of the disease in favorable cases of this type is certainly not too long for an infection of such possible personal and social gravity and it is not followed by that two or three months' period of uncertainty, as is the case when sulfanilamide has been administered



Whether or not the patient is progressing satisfactorily under local treatment alone can be readily determined by the persistence of urethral discharge and by careful study with the two-glass test. If, by the end of ten days, there is urethral discharge during the day (aside from a slight morning discharge) and the first glass of voided urine remains definitely cloudy, there is little possibility of the avoidance of posterior urethral infection and no time is saved for the patient by a further avoidance of a sulfonamide. For, just so soon as the posterior urethra is infected, from three to four months have been added to the disease duration, no matter how careful may be the local treatment. And this added time extends far beyond the common period of uncertainty of cure holding in those patients whose disease has reacted favorably to the use of this drug. Thus, no time is saved in any such cases by further withholding it. To all patients presenting themselves with posterior infection already having occurred, and to whom the drug had not been given previously, it would be wise to start its administration at once. Even in those who have had sulfanilamide some time before, it is justifiable to try it again or it is, perhaps, wiser to turn to sulfapyridine or some other derivative. Such a change often has been productive of good results.

If, as it has previously been said, there is not a marked improvement in the patient's condition by the end of the fifth day of medication, the drug should be abandoned. It may be repeated after a rest of ten days or another derivative may be tried. Where a marked improvement has taken place the drug should be continued in a maintenance dose for ten days or two weeks longer and then withdrawn.

**Local Treatment.**—There is abundant statistical support for the belief that the concomitant use of local treatment brings about a larger percentage of successful results. Its case-holding properties are of high value and, by its use, great good is done for those who are not favorably influenced by sulfanilamide. And there is at present no reason to suppose that we are about to be in a position wherein we may discard local measures and still carry all our patients on to the point of cure. For this reason, there is every need that the physician have as good an understanding of them as it is hoped he has regarding the use of sulfanilamide.

One of the great faults with descriptions of local treatment for gonorrhea in the past has been their confusing qualities. To mention everything that *can be done for gonorrhea without a description of one good simple plan of treatment* is to foster repeated changing from one plan to another without giving either plan an opportunity to produce what good it can. As the writer elsewhere has said, one is far better equipped to treat gonorrhea in the male if he knows thoroughly one simple, effective plan of treatment, and what to expect of it, than if he knows a little about many plans. To this end it is a mistake for any one to suggest that the plan of treatment carried out by himself is the only worthwhile plan and that the measures he uses are far better than any others. There are many good plans of treatment and far more good medicaments to use.

In the writer's plan of local treatment there is nothing really new. It is a selection of things that seem best and safest, used in a way that cannot harm the patient. That he uses permanganate of potash and mild protein silver is not to suggest that other things in other hands may not give equally good results. As a matter of fact, all we are trying to do in the treatment of

gonorrhea by local measures is to cleanse and to stimulate the infected mucous membrane. And even to hint that these are the only chemical substances that safely and efficiently do such things is to show a colossal amount of ignorance. There probably are hundreds of things that can produce the same results. However, for purposes of simplicity, let us continue to talk in terms of potassium permanganate and mild protein silver realizing that those with other loves may pick any color in the rainbow.

We might even classify some of the more commonly used chemicals in regard to the strength of solution most appropriate for use in this disease as follows:

|                                |                       |
|--------------------------------|-----------------------|
| Mild protein silver (U.S.P.)   | 5 per cent solution   |
| Strong protein silver (U.S.P.) | 0.5 per cent solution |
| Neutral acriflavine            | 1:8000 to 1:3000      |
| Potassium permanganate         | 1:8000                |
| Silver nitrate                 | 1:10,000              |

Aside from the choice of chemical there looms the clinical response that one should expect from their application. It is here that the utmost familiarity with the clinical manifestations of this disease under varying conditions is essential. Without it one is prone to attribute to treatment things that belong to the disease and to build up a false sense of values. Our literature upon gonorrhea is cluttered with the results of faulty interpretations born of a lack of knowledge of the disease and what treatment does to it and the patient. Such a tendency is very obvious in the present avalanche of reports upon the use of the sulfanilamide group of drugs wherein every case that seemingly clears up in a few months is taken as statistical proof of the value of these drugs. Nature time, and the concomitant use of local measures, are largely disregarded. It is because of this that the manufacturers of chemicals and biologicals find it so easy to build up a plausible and seemingly striking clinical *aura hysterica* whereon to launch their latest dreams—toward almost inevitable clinical failure, to the chagrin of those clinicians who gave them the first push.

To avoid such misinterpretations the physician should keep in mind those things that make any plan of treatment devoid of results. For it is outstanding in this disease that one's therapeutic results are dependent to an enormous extent upon what the patient does. If he subjects himself to the influences of alcohol or sexual excitement his gonorrhea will not go smoothly on to cure no matter what treatment his physician uses. If he sleeps with his wife, no matter how much he may dislike her, or, if he takes long automobile rides, his disease almost invariably will follow a prolonged erratic course. Thus, if one would have his gonorrheal patients do well, he must insist upon an avoidance of these things, indeed, he must repeatedly insist.

He need pay no attention to what the patient drinks or eats provided there is no alcohol in it. The proof that diet has no direct influence upon the course of gonorrhea is so easily arrived at that one wonders why physicians for so many years harassed their patients by a needless assortment of dietary restrictions.

Oral medication, other than sulfanilamide, or its derivatives, in gonorrhea assumes much the position of a placebo so far as curative values are concerned. For we have no other drug which, when taken orally, exercises

any real curative effect. It is true that sandalwood oil at times will reduce discharge and other symptoms but even this is not in the direction of cure, for they return when the oil is stopped. We are not interested in hiding infection but are intensely interested in its cure. Hence, he who relies solely upon oral medication by the older drugs as a means of cure, should expect just what he is almost sure to get, prolonged gonorrhea.

Years of experience have shown that our best results from local treatment have come from the injection, by one means or another, of chemicals into the urethra. There is also incontrovertible proof that the earlier these treatments are given the smaller is the number of patients whose infections pass into the posterior urethra. In fact, it is rare for an individual whose local treatment has not been started before the sixth day of the disease to escape posterior extension. To this effect it is of interest to cite an investigation made by the writer some time ago on his office patients.

One hundred consecutive patients were selected whose treatment was started prior to the sixth day of the disease. Of these, 14 had a posterior involvement when first seen, which precocious disease spread usually was to be explained by the fact that the patient had had either sexual intercourse, much alcohol, or both, late in his incubation period. Six cases were nonco-operative in that they indulged in alcohol or sexual excitement. That left 80 good experimental animals of a type that should be required for any estimation of therapeutic values in this disease. Of these 80 patients, 68, or 85 per cent, failed to get a posterior urethral involvement and 12, or 15 per cent, had such a disease extension in spite of careful treatment and exemplary conduct.

During the same period of time covered by these 100 cases there were seen 183 patients after the fifth day. Of these, all but 12 had a posterior urethral infection when first seen and only 2 eventually escaped such involvement.

In the planning and carrying out of local treatment of the urethra in the presence of gonorrhea, it is necessary that one be able to draw the dividing lines between what is due to gonorrhea, to patient conduct, and to treatment. A careful study of these features makes it possible to lay down some useful rules to aid in the understanding of the clinical behavior of the disease. These rules are quoted in part from an article by the writer in Vol. VI, p. 67, of *The Cyclopedia of Medicine* (F. A. Davis Co., Phila.). *Guides to Treatment:*

1. Except with astringents, which, in the writer's opinion, have no place in the treatment of gonorrhea, Nature's first evidence that gonorrhea is progressing toward cure is a progressive lessening of the amount of purulent discharge.

2. The best index of the activity appears in the voided urine and the cloudiness of the urine should decrease day after day until that fluid becomes crystalline.

3. As the cloudiness diminishes, the urethral pus undergoes coagulation, forming shreds, which, in acute infections, are an evidence pointing to the success of the treatment used. If the urinary picture does not quickly and progressively clear, it is due to one or more of the following causes:

- (A) The patient is not mustering up any curative responses.

- (B) The medication is too strong.

- (C) The medication is being used too often or not often enough
- (D) The medication is not the best for the given case
- (E) The patient is indulging in either alcohol or sexual excitement
- (F) The patient is one subjecting himself to too much physical activity
- (G) The patient is sleeping with a female
- (H) The treatment is being used unskillfully

4 The urinary picture clears long before the gonococcus disappears from the infected mucous membrane so that from the period of complete latency on the two glass test merely serves to show that the patient is not getting worse. It is in no sense a suggestion or proof of cure.

A thorough familiarity with the things not good for gonorrhea makes a good foundation for the doing of those that are helpful. One cannot spend too much effort in gaining patient cooperation and wherever possible the physician should carry out the treatment himself. If however it is not

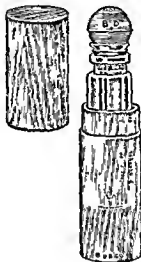


Fig. 173. A convenient outfit for the patient's use.

possible for the patient to visit the physician as often as is wise and his infection is confined alone to the anterior urethra it is well to supply him with materials and instructions for self treatment. He should be given a blunt nozzled glass syringe that can hold no more than 2 drams. (Outfits with rubber bulb glass syringes of  $\frac{1}{8}$  ounce size may be obtained from all surgical supply houses.) For self treatment 0.25 to 0.5 per cent strong protein silver solution is at least as good as any it is probably better. It keeps well has no great staining qualities and gives about the amount of mucosal stimulation desired.

The patient should be instructed to pass urine and inject into the canal a syringe barrellful of the solution and hold it in by digital pressure for at least five minutes twice a day. By the use of this small syringe he cannot spread infection as it does not hold enough fluid to cause some of it to be forced past the cut off muscle.

The treatment the writer uses in his office is carried out as follows. The

patient passes urine into two glasses and the anterior urethra is gently irrigated with 1:8000 potassium permanganate solution under such a low pressure that none of it is forced into the posterior portion of the canal. When the anterior urethra has been cleansed in this way the permanganate solution is allowed to drain out, after which not more than 6 c.c. of 5 per cent mild protein silver is placed in the anterior urethra. For purposes of cleanliness and patient convenience, the penis is then covered with absorbent cotton 2 by 6 inches and the thickness of the layer in the roll and is held in place by the writer's penis clamp.

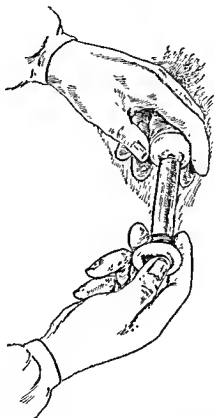


Fig. 174.—Method of filling the anterior urethra with solution to be retained.

The medicament is kept in the urethra for from five to ten minutes. It then is allowed to drain out and the penis is covered by a strip of absorbent cotton which is held in place by two No. 10 rubber bands. The patient is instructed to replace this dressing after the first urination, as there still is some mild protein silver present that could stain the clothing. After the second urination he is told to wash the penis and *not to replace the rubber bands*.

This treatment is carried out daily for the first two weeks. If, at the end of this time, there has been no discharge for several days and the first glass of urine contains only shreds, a forty-eight hour interval is allowed before the next treatment. If, during this length of time, the discharge has recurred and the first glass of urine looks worse, the daily treatments are

carried out for another week. In those patients who do not follow so favorable a course as the above, the daily treatments are continued through the three weeks without trying a forty-eight hour interval.

Just as soon as forty eight-hour intervals are safe, as indicated by an absence of discharge during that interval, the treatments are thus spaced and continued so for the next two weeks. An interval of seventy two hours between treatments is followed for the next week, after which, in most

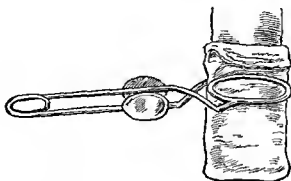


Fig. 175—Method of retaining solution in the urethra

patients escaping a posterior urethral extension, it is safe to carry out the tests of cure.

If during the above course of treatment the patient cannot return at the proper interval he is ordered a  $\frac{1}{8}$  ounce urethral syringe and some 0.5 per cent solution of strong protein silver. He is carefully instructed in the technic of giving himself an urethral injection and told to do so twice a day and to hold the fluid in for five minutes.



Fig. 176—Temporary cotton dressing held lightly by rubber band

When the above complete regime cannot be followed, as is the case with many traveling men, the strong protein silver injections are ordered. Careful instructions are given regarding the need for seeing a physician if there are any suggestions that the disease has progressed into the posterior urethra.

**Posterior Urethral Infection**—The onset of posterior urethral involvement usually is evidenced by a change in the second glass of urine and considerable vesical discomfort on the part of the patient. One should bear in

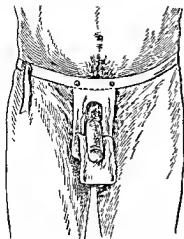


Fig. 177.

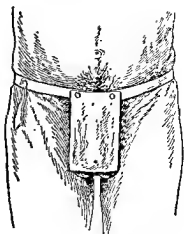


Fig. 178.

Fig. 177.—Sanitary bag. This is the most satisfactory penile dressing. In the bottom of the pouch can be placed cotton or, preferably, gauze. If sufficient of either is properly used drainage is not interfered with and the clothing is well protected.

Fig. 178.—Sanitary bag closed.

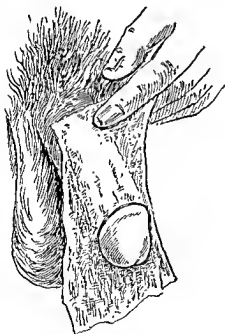


Fig. 179.

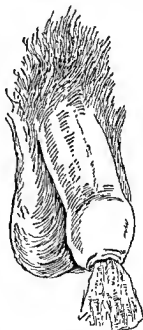


Fig. 180.

Figs. 179, 180.—Old butterfly type of penile dressing. This dressing is not sufficient to prevent the soiling of the clothing where colored solutions have been injected into the urethra. It is a satisfactory dressing for the collection of urethral discharge, however.

mind, however, that not all patients have frequency of urination with the onset of posterior involvement and that, occasionally, there is very little change in the appearance of the second glass of urine.

With the beginning of posterior infection, whether it be accompanied by mild or severe symptoms, it is best to stop local treatment and place those patients who are definitely uncomfortable upon some oral sedative. For this purpose small doses of codein or paregoric, in one dram doses, are useful. One makes no mistake in delaying the return to local treatments for a week after the patient has ceased to have annoying vesical symptoms. By doing so he will reduce the incidence of epididymitis and other complications.

When it is safe and wise to start local treatments, the writer carries out intravesical irrigations of 1:8000 permanganate solution under low hydrostatic pressure (not more than  $3\frac{1}{2}$  feet of pressure) at forty-eight hour intervals. In doing this the fluid is allowed to flow into the bladder and is then voided by the patient. The bladder is never filled, only partly so, and the patient carries some of the fluid away with him.

When it seems to be perfectly safe to start treatments to the prostate gland, which is never in less than three weeks from the date of posterior involvement, this is done in the gentlest manner. The bladder is irrigated, some fluid is left in it, the gentlest digital pressure is made over each lateral prostatic lobe and the patient voids some of the retained permanganate solution. If this causes the slightest increase in symptoms, further efforts in this direction are withheld for a week or two, but the irrigations are continued. If no recurrence of discharge takes place, the prostatic stroking is carried out twice a week, the pressure upon the gland being increased at each treatment as gland tolerance increases.

To start prostatic treatments too early or too vigorously is a serious error, for most patients are made worse for weeks. Thus, it is well to delay it until it seems eminently safe and even then to approach it as a procedure that can do great harm if one makes mistakes in judgment.

When trial has proved massage safe, it should be continued twice a week until the expressed prostatic secretion shows not more than five leukocytes to the high power field. Postgonorrheal prostatic infections usually respond well to prostatic massage unless the gland has been greatly damaged by the infection or by digital trauma. Lack of progress toward cure should arouse the suspicion of a previous focal infective prostatitis—a description of which is to be found under that heading.

To fail to treat the prostate of the patient who has a posterior urethral infection is to increase the number of those patients who so frequently are labeled "chronic gonorrhea." Not that many of them really have gonorrhea but that a considerable number of them have a discharge from time to time after each alcoholic or sexual debauch. On the other hand, the diagnosis of chronic gonorrhea occasionally is correct, since the gonococcal infection, having persisted as a symptomless smouldering process, suddenly becomes active and remains so for varying lengths of time.

A discussion of the place of prolonged hyperthermia in the treatment of gonorrhea will be found under that heading in the chapter on Methods of Treatment.

**Tests of Cure in Patients Not Treated With Sulfonamides**—In these cases, our so called tests of cure are based upon the fact that, if there are gonococci present, certain procedures will stir the infection into a degree of activity that makes it possible to demonstrate that the patient is not cured. It should be remembered in this connection that these things are not true



proofs of cure, we have no real proofs of cure aside from time, and the fact that an individual can drink alcohol and indulge repeatedly in sexual intercourse without developing symptoms of the disease or infecting others. Even the complement fixation test is not to be relied upon too implicitly, for more reasons than it is necessary to enumerate here.

Realizing these shortcomings in our science, one should exercise much caution in pronouncing patients cured. As a matter of fact, there is just a little more risk in so doing than the conscientious physician should care to assume. It is far better to tell the patient of the faults in our so-called proofs of cure and instruct him to use good condoms during the first three months of his return to sex indulgences. It is true that few, if any of them continue to use condoms for the full three months, but it is equally true that the patient not treated with sulfanilamide who uses alcohol and indulges in coitus as many as five times without a return of symptoms, is cured of his gonorrhea. Despite seeming contradictions of this statement in the literature, the writer, after thirty-five years of observation and the obtaining of truthful histories from seeming exceptions, has no hesitancy in making it.

In order to carry out these limping proofs of cure it is a good plan to begin by searching the sediment of the first glass of urine for pus and gonococci by the method previously described. Failing to find any, a bulbar sound of the largest size that will pass through the urinary meatus is passed back and forth from that point to the bulbomembranous junction several times. The patient is given slides for the collection of discharge if any appears. If there has been no discharge, a solid sound should be passed to the bulbomembranous junction, not through it, and the entire anterior urethra should be massaged rather vigorously upon it. If, after this, there is no urethral discharge, some alcohol should be consumed on several occasions and the patient should indulge in sexual excitement but not coitus. As an added test one might give 0.5 c.c. of stock gonococcic vaccine, a thing that seldom is done.

Should the patient fail to develop any discharge or show any pus or gonococci in the sediment of his first glass of voided urine after these tests he is in all probability cured. But that one must in any event qualify pronouncement of cure urges the wisdom of measures for the protection of others. If there is available a laboratory particularly interested in the later methods of gonococcus culture, secretions from the various portions of the tract should be cultured as an added precaution against error.

**Tests of Cure in Sulfonamide-Treated Patients.**—It is generally conceded by those having experience with patients given sulfanilamide or any of its derivatives, for gonorrhea, that our older tests of cure leave much to be desired in those thus treated. The admitted penchant of these drugs to bring on in many patients a socially dangerous period of quiescence in the midst of infection, a quiescence that frequently cannot be stirred into recognizable activity by those influences that almost invariably do so in patients who have not had any of these drugs, introduces an imperative demand for far more careful studies before cure even is suspected.

We have learned from sad experiences that not every patient seemingly cured by these drugs is really cured. The infection of others after such seeming cures is by no means rare. Indeed, it probably is far more common than we even suspect. For, as previously has been pointed out, a great

change has taken place that stands as a very definite menace to disease reduction. In the old days when gonorrhea was transmitted from man to woman, we usually knew within a week from the decidedly definite symptoms of the latter, that it had occurred. If there was any question in our mind we found little difficulty in demonstrating the gonococcus in her discharge in the early days of infection.

As cited elsewhere by the writer, women infected by those whose symptoms are reduced or obliterated by sulfanilamide medication become absolutely symptomless gonococcus carriers from the start and remain symptomless for months despite alcohol and sexual intercourse. To the present writing the author has seen six such cases. Some were suspected because they transmitted the disease and others because they had been exposed by symptomless males who later showed a recrudescence of the infection which they thought was gone. None of these six women showed the slightest signs of gonorrhea and it was with great difficulty that the gonococcus was demonstrated in either the cervical fluids or those from Skene's glands.

With such dangerous things in the background for supposedly cured sulfanilamide cases, it is obvious that every patient should be subjected to the most rigid studies before much confidence is felt in real cure. And there is much evidence that this feeling of suspicion should be held for at least two months no matter how fruitless may be the efforts to discover latent infection. As previously stated, these patients often fail to be influenced by alcohol and, even, sexual intercourse during the first six weeks after the drugs have been discontinued. Added to these things is the fact that gonococci repeatedly have been cultured from the urogenital secretions of many of these patients in the total absence of microscopic pus.

In the face of so many unfortunate things to instill doubts, anyone who tries to think through is sure to see the urgent need for far more careful tests of cure than hitherto have been employed generally. Also, he sees the urgent necessity for a repetition of such studies at least six weeks after sulfanilamide has been discontinued. Hand in hand with such convictions runs the wisdom of utter frankness with the patient to the end that he understands the great need for the protection of others during this period of doubt.

Not only should such patients be subjected to all the older tests of cure and to the careful employment of those more refined methods for the microscopic discovery of the gonococcus described in the chapter on The Preparation of Material for Staining, but, wherever it is possible to carry out cultural studies on such patients, it should be done. For, in the hands of some careful workers, notably Carpenter, such studies have proved twice as reliable as have microscopic searches alone. This fact, alone, urges the great need for their wider use as well as the urgent necessity that bacteriologists throughout the country pay far more attention to the matter than at present is the case.

As the technic for collection and the care of such secretions has been outlined elsewhere in the book, there is no need for their repetition here.

#### THE COMPLICATIONS OF ACUTE GONORRHEA, AND THEIR TREATMENT

The time long since has passed when it was good science to consider even such gonorrheal complications as posterior urethral involvement to be in the natural course of the disease and not in our power to prevent. Even

more true is this regarding most of the other possible complications of the disease. This has been shown very clearly in late years by their scarcity under the gentler plans of treatment and better patient conduct. Therefore, the most important part of this phase of the question is the prevention of such needless extensions. In order to do this, treatment must be considered first from the standpoint of the possible harm it may do and secondarily from that of its possible good. Also, the things that the patient may do that could serve to precipitate complications should be considered to the end that he is urgently warned not to let them enter the picture.

It requires but meager clinical experience with this disease to reveal the fact that most of these complications are either traumatic in origin or are the result of poor personal hygiene on the part of the patient. Some of them, notably follicular abscess, Cowper's abscess, epididymitis and seminal vesiculitis, are prone to follow high intra-urethral or intravesical pressure. And to this end high-pressure urethral injections and irrigations should be avoided and the patient should be instructed to avoid sudden increases of intra-abdominal pressure from heavy lifting and the like if the bladder contains any quantity of infected urine. Direct trauma to the urethral mucous membrane likewise is a potent cause of complications and should be prevented by avoiding the passage of instruments of any type into the urethra while the gonococcus is present. Under such a régime gonococcal atthritis would almost disappear.

The avoidance of external trauma to the penis practically would obliterate paraphimosis and phimosis, as cleanliness of the preputial sac also would remove balanoposthitis from the clinical picture. And the shunning of strong chemical applications to the urethra would make infection in that structure milder and more easily cured.

Extreme care may reduce almost to the vanishing point the occurrence of most of the complications of the disease. Still, from time to time, patients in whom these complications are established will make their appearance in one's office. For this reason it is almost as necessary to know how to treat them as it is to know how to prevent them. And in their treatment one should avoid carefully the temptation to consider as emergencies things that would recover without treatment if given an opportunity. Few of them are real emergencies in regard to time. In fact, except for acute urinary retention, which usually can be overcome without catheterization by having the patient try to void while sitting in a bath of hot water, and definite abscess formations, gonococcal complications rarely require speed for their treatment. Nature shows remarkable curative power in overcoming many of these seemingly dangerous conditions and, often, radical and over-energetic measures increase instead of minimize such dangers as do hold.

**Phimosis.**—Inflammatory phimosis is generally due to direct trauma to the penile integument which induces a more marked strain of the lymphatic vessels whose lumina already are reduced as the result of toxic irritation. The condition usually subsides promptly if the penis is immersed for from ten to twenty minutes several times a day in hot water. If there is an associated balanoposthitis, as so commonly is the case, it should receive appropriate attention.

**Paraphimosis.**—Paraphimosis is due to a constriction of the lymphatic channels resulting from too continuous retraction of a prepuce with a

naturally small meatus or one that has been made smaller through partial lymph channel block from inflammation as the result of a gonorrheal infection. If the prepuce remains long in its retracted position the nourishment to its skin may be reduced sufficiently to cause necrotic ulceration at the point of constriction. At times small ulcers appear upon its exposed surface and more rarely upon the glans penis.

The treatment of this complication is outlined elsewhere under the title Paraphimosis.

**Balanoposthitis**—Inflammation of the glans penis and its apposed preputial surface usually is the result of irritation from retained acid discharges from the urethra or from bacterial growth within the preputial sac. Rarely is it a true tissue infection. Usually it may be prevented by proper and repeated cleansing of the sac in the presence of gonorrhea or other bacterial conditions and it is readily cured by such measures and irrigations with 1:5000 potassium permanganate solution. The use of either a boric acid

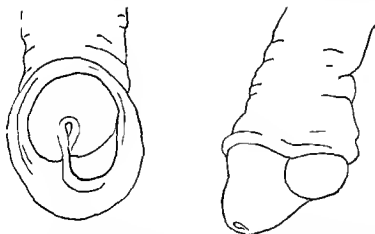


Fig. 181—Front and lateral views of deformity due to an abscess of a parafoveal gland.

powder or ointment after cleansing is protective and relieves irritation. Any other mild antiseptic ointment or powder is equally efficient as a rule.

**Phlebitis**—Inflammation of the superficial and, at times, deep veins of the penis is ordinarily an aftermath of penile trauma. As a rule the condition subsides gradually and completely upon the application of heat by penile immersion, and the slight swelling it occasions likewise disappears.

**Lymphangitis**—Penile lymphangitis almost invariably is the result of either coitus or masturbation in the presence of gonorrhea. Usually it is associated with marked swelling of the inguinal lymph nodes. It is amenable to the same treatment as in phlebitis, that is, heat. Both have been considered at greater length in the section on Diseases of the Penis.

**Parafoveal Abscess (Suppurative Tysonitis)**—The parafoveal glands, one on each side of the frenum, at times are infected by the gonococcus. Their infection occurs by way of the preputial sac and not through the urethra.

They should be opened early to avoid rupture into the urethra if possible. If they are large enough it is best to catch their overlying surfaces with the mouse tooth forceps and to clip off with scissors a good sized piece of tissue

so that, when retraction takes place, the resultant opening is of such a size as to make treatment of the gland easy and painless. It should be borne in mind that structures like these glands may retain gonococcal infection for months and that, after opening, the gland mucosa should receive the same treatment as the urethral infection is given. This can be done readily by means of a syringe and a round-tipped needle. Better results follow the use of mild solutions than accrue from efforts at quick sterilization of the channels with the stronger chemicals.

**Follicular Abscesses.**—These suppurative accumulations are usually the result of direct trauma from over-zealous treatment. They are seldom seen in gently treated patients. They vary in diameter from a few millimeters to several centimeters. The smaller ones usually require no treatment other



Fig. 182.—Deformity due to follicular abscess. Lateral view.



Fig. 181.—Deformity due to follicular abscess. Ventral aspect.

than being let alone. Some of these rupture into the urethra spontaneously, while most of them undergo resolution and eventually leave a small, round, shot-like indurative body wherein autolytic sterilization has occurred.

Occasionally, these abscesses break through the corpus spongiosum and point toward the skin surface. They usually are slow in attaching themselves to the skin and, if one waits for this, there may be an enormous pus cavity which so devitalizes the urethral mucous membrane as to eventuate in a urethral sinus. It, therefore, is well to open these pus sacs early before they have caused much destruction. Their surgical treatment has been described elsewhere.

**Cowper's Abscess.**—Abscess of Cowper's gland practically never occurs in individuals not subjected to high intraurethral pressures either from irrigations or as the back-pressure results of neglected stricture anterior to the

entrance of these ducts into the bulbar urethra. The abscess almost always points to its own side of the bulb of the corpus spongiosum in the perineum. With the index finger in the rectum and the thumb against the side of the perineum its induration can be felt long before the abscess reaches the skin surface. For the treatment of this complication the reader is referred to the section on Acute Cowperitis.

**Acute Prostatitis**—Great swelling of the prostate is common in the hands of those physicians who massage the gland too soon. As it has been stated elsewhere there may be a slight or even a marked elevation of temperature in the absence of abscess formation. There always is a marked leukocytosis which is likely to lead the physician into needless surgical procedures unless he is aware of the phenomenon. It usually continues for some time after the subsidence of the swelling.

The treatment of this condition has been covered in the section bearing the title of Gonorrheal and Postgonorrheal Prostatitis.

**Prostatic Abscess**—This has been considered under this title in the chapter on Diseases of the Prostate Gland.

**Seminal Vesiculitis**—Unquestionably gonorrheal seminal vesiculitis is a comparatively rare malady. At least if it is frequent the structure brings about self sterilization in most cases during the first few weeks of its existence. For there is nothing in the clinical picture of gonorrhea to suggest that at the stage when prostatic massage is a safe procedure the seminal vesicles are infected in more than two out of a hundred cases. The writer in his treatment of the later stages of posterior gonorrhea with its concomitant prostatitis pays absolutely no attention to the seminal vesicles except in those patients who experience a reappearance of urethral discharge after nocturnal emissions and his patients get well. One could not ask for better proof of the rarity of this disease extension for under such vesicular neglect the patient with seminal vesiculitis does not recover and the course of his disease deceives neither the patient nor the physician into a belief that cure has been accomplished.

Where gonorrheal seminal vesiculitis is present its treatment during the acute stage is heard either by rectal injection or by means of the hot sitz bath. In its later quiescent stages the treatment rests in the promotion of drainage through digital stripping. To prevent constant urethral exacerbations this is best done three times a week so that time is not given between strippings for the disintegration of too much pus with its increased amounts of gonotoxin. At best cure comes only as the result of months of such treatment. The writer has seen no benefit of note from either vaccines, foreign proteins or diathermy. Apparently, it is a matter of promotion of local immunity response by virtue of better drainage.

The injection of substances into the vesicles either by way of the ejaculatory ducts or vasa deferentia has many exponents. The writer perhaps is old fashioned in feeling that the longer way is usually the safer way. There is much reason to believe that direct tampering with these minute tubules often results in coarctation of them with its consequent sterility. Seminal vesiculectomy and vesiculotomy are major surgical procedures that hardly are warranted by the mildness of the lesion. They are fertile soil for the development of neuroses and they are likely to be followed by sterility if carried out on both sides.

**Epididymitis.**—Like most of the complications of gonorrhea, the incidence of epididymitis depends largely upon the patient's behavior and the treatment given him. There is overwhelming reason to believe that in about 98 per cent of the cases the infection reaches the epididymal tube by being forced down the vas deferens. At least, one easily can obliterate this complication almost entirely from his office practice by dropping his irrigating tank to a safe level, avoiding intraurethral instrumentation during the course of gonorrhea, exercising care in his digital manipulations, per rectum, and by instructing his patients not to exert themselves heavily or to indulge in sexual excitement when there is any quantity of infected urine in their bladders. Surely these would not prevent the transference of infection either by continuity of surface, lymphatics or blood stream.

**Symptoms.**—The onset of symptoms usually takes place within twenty-four hours of the clinical occurrence precipitating it. At first there is a sensation of discomfort within the scrotum which the patient interprets as being in the testicle. Shortly, this discomfort becomes a pronounced pain and the epididymis swells rapidly. The size of this swelling differs in different patients. In some it becomes enormous within the first two days. In others it is of moderate grade or only slight. It may stay this way or, within a few days, it may become suddenly much greater. When the swelling is marked, the scrotal wall frequently becomes hot and reddened and tenderness is extreme.

In the vast majority of cases there is a temperature elevation. In most this is less than 101° F. but in some few it may reach 104° F. or more.

Where infection has taken place by continuity of surface along the vas deferens the first symptom frequently is pain in the lower abdominal quadrant of the corresponding side. This may be mistaken for appendicitis if on the right side and not a few such patients have been operated upon for that condition. Occasionally, in these cases, the first symptoms are those of ureteral block during the first twenty-four hours. The abdominal and renal pains subside and the pain centers around the inguinal ring. There then appears a marked descending swelling along the vas deferens with rapid swelling of the epididymis itself.

The duration and severity of the epididymal symptoms vary greatly in different individuals and frequently with the treatment received.

**Treatment.**—Primarily the treatment of gonorrheal epididymitis is a dressing that gives both support and pressure to the scrotal contents. (A description of the means whereby these are accomplished will be found under the heading of Scrotal Support and Pressure.)

Aside from this, it is general custom to give daily intravenous injections of 10 c.c. of a 10 or 20 per cent solution of calcium gluconate for five or six days. In a majority of cases this quiets the pain and hastens resolution. Calcium gluconate also can be given orally in the dose of 60 grains three times a day.

Patients having a temperature of 101° F. or over should be placed in bed. Most patients do not have so much temperature elevation and can be safely kept ambulatory.

Some have reported good results in a few cases from the use of sulfanilamide but, in most cases, it proves quite disappointing. Corbus recommended medical diathetmy and there are some others who favor it.

Prolonged hyperthermia is not an office procedure and is far more dangerous than is the epididymitis despite the fact that it is said to give prompt relief to most patients

In the rare presence of abscess formation operation is indicated, but those who advise surgery in other cases seemingly lose sight of the fact that these patients almost invariably get well without it and in less time than it takes to get over the operation. They have shown little that is as good as medical treatment and practically nothing that is better

**Adenitis**—Inguinal adenitis in gonococcal infections is rarely a matter of much moment to either the physician or his patient. These lymph nodes swell to a minor degree and give a little pain for a few days in many patients. In some few they become quite swollen and painful. They undergo resolution without suppuration and without local treatment

**Arthritis**—The incidence of gonorrheal arthritis in roughly treated and in poorly behaved patients is so great in comparison with other groups of patients as to leave little doubt regarding this complication being generally precipitated by direct trauma to infected mucous membranes. It, however, takes place upon rare occasions in the most gently treated and best behaved of patients but even in them there is of course the possibility that the gonococcus enters the circulation as the result of manual pressure upon the penis

There is reason to believe that some of the minor joint inflammations occurring during the course of gonorrhea are the result of toxic absorption from the urogenital structures and not to the actual implantation of the gonococcus into the joint via the blood stream. In the more massive joint involvements, however there apparently is a definite gonococcal implantation

**Treatment**—The treatment of choice in severe gonorrheal arthritis if such is available, is prolonged hyperthermia if the employment of sulfanilamide has failed to produce relief promptly. If this is not available or for some reason should not be employed, one must fall back upon the older method of joint immobilization by the use of a heavy plaster cast. At the end of two weeks, such a cast should be removed, passive motion of the joint should be given and the cast then reapplied for two weeks. Thus periodic removal of the cast and passive motion should be done as described until the joint no longer is markedly inflamed

In the presence of milder joint involvements that do not lend themselves to cure by sulfanilamide it sometimes is of value to give small doses of gonococcal vaccine (not over 50 000 000) and to repeat the injection on alternate days on not more than three occasions, if the case is seen early

Some have claimed good results from the use of foreign protein injections, while Harrison speaks highly of the value of the intramuscular injection of 10, 20, or even 50 c.c. of fluid drawn from the swollen joint every three or four days

#### CHRONIC GONORRHEA

Few medical terms have been misused more than has that of chronic gonorrhea. For years it has been applied with deplorable looseness to almost every purulent condition of the urogenital tract that could occur to a patient, just because he may have had an attack of gonorrhea at some



period near or remote. And it has been one of the greatest of urologic stumbling blocks. Indeed, in these fast-moving days it is being called "chronic" after twenty-eight days. In the male, it is a rare condition, and in the female it is almost the rule unless proper attention has been given to her usual points of gonococcal colonization.

The term chronic in this connection is more often used to denote time than it is to give any idea as to disease activity. This, perhaps, is as it should be, but it is well that we make a dividing line somewhere between our terms acute, subacute and chronic in this disease. Considering that the natural course of events in the gently-treated, well-behaved male patient is acute, subacute, and cure, it is obvious that chronic gonorrhea is a thing aside from and beyond the usual disease trends. In view of the fact that the gonococcus rarely lingers in the male urogenital tract for longer than six months without an easily demonstrable cause for its presence, it is, perhaps, wise to limit the term chronic to those individuals in whom the gonococcus persists for a longer period.

One never should apply the word gonorrhea to any condition of the urogenital tract unless he can demonstrate the presence of the gonococcus. By following this rule he will not include that multiplicity of infective conditions that have no connection with gonorrheal infection nor those that are due to secondarily invading bacteria upon a soil prepared and deserted by the gonococcus.

Therefore, limiting the term to cases in which the gonococcus can be demonstrated six months or more after the onset of gonorrhea, we are faced with the task of determining just why the gonococcus has lingered so long. These rarely are hard to discover and, in by far the large majority of cases, will be found due to patient conduct that has included repeated indulgences in alcohol, sexual intercourse, or both, during at least the first half of the six months.

In a smaller number of cases the condition will be due to injudicious and roughly applied forms of treatment by either the patient or his physician. Some few are to be accounted for by the lack of ability on the part of the patient to build up the required immunity responses.

The rest of the cases have as their underlying cause poor drainage from some mucous channel in association with the main conducting portion of the tract. In point of frequency these are the prostate gland, the seminal vesicles, Cowper's glands, the urethral follicles or some small paraurethral sinus.

Treatment.—The treatment of chronic gonorrhea, therefore, rests in the elimination of its cause or causes. As patient conduct is the most frequent cause, it urges upon the physician the necessity of revealing that fact to the patient. With the elimination of this factor cure rarely is a matter of difficulty. It involves the discovery of the points of poor, usually, intermittent drainage and such forms of treatment as have been urged elsewhere for the promotion of good drainage in them.

It is useless to continue treatment of the main portion of the tract and to neglect the feeders that keep it discharging pus. And too much treatment to the urethra very commonly leaves the patient with an urethral discharge that persists long after the gonococcus is gone. Just so soon as there is reason to believe that the gonococcus has been banished, sometimes even

before, it is well to discontinue chemical applications to the urethral mucosa and bend one's efforts closely to the promotion of proper drainage in continued irritative feeders. When this is done, as elsewhere has been said, the urethral mucous membrane stops building up a protective layer of squamous cells and by the time the condition in the feeding foci is cured, the urethra no longer is forming shreds to disquiet the patient whose mind for so long a time has been directed to the appearance of his voided urine.

### NONSPECIFIC URETHRITIS

Year after year the question of nonspecific urethritis assumes greater and greater importance as we find that it so frequently is the only observable symptom of deeper lying pathology that is of importance. It differs from gonorrheal urethritis in that the gonococcus is not present. This all important difference, however, is not always so easily demonstrated as it generally is supposed. And it never should be assumed that a man who has exposed himself sexually has not a gonorrheal urethritis simply because one does not find the gonococcus. It happens with sufficient frequency to command caution that some gonorrheal discharges contain so few gonococci as entirely to escape detection on one or several microscopic studies. So true is this that one does well to make it a rule never to pronounce a discharge nongonorrheal on one study. If the gonococcus is not found it is justifiable to insist that the patient consume some alcohol and present himself for another study before this disease is dismissed from consideration. In fact the latter is a good procedure to apply to that increasing number of married men who have indulged in extramarital intercourse and want to be assured that they have no disease before resuming home activities. Latent infections are not altogether rare and they invariably will be stirred into an activity by the consumption of alcohol that will make it a simple matter for the physician to make a diagnosis and thus, prevent transference of the infection.

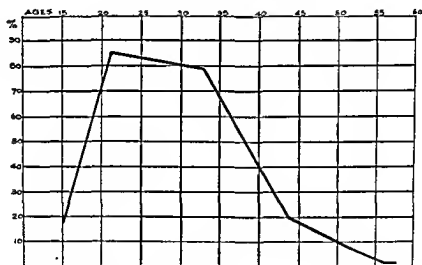
Contrary to the general belief, nonspecific urethritis is a very common malady, occurring in about 30 per cent of patients who present an urethral discharge. Equally contrary to general belief, is the fact that one cannot possibly tell the difference between nongonorrheal and gonorrheal discharges without microscopic study. Either may be scanty, or profuse, mucoid purulent, yellow, greenish or blood stained. They have no fixed diagnostic differences other than those the microscope reveals and he who presumes to make a diagnosis based on a history, often untrue, and the microscopic appearance of the discharge, is courting disaster for himself and others.

Purulent nonspecific urethral discharges that are not the direct result of urethral trauma are extremely rare before the age of eighteen years and almost do not occur after forty-five years of age. Beyond this age urethral discharges usually are composed of mucus alone or of mucus and many epithelial cells. Of the latter, after forty five years of age urethral stricture is almost invariably the cause.

In a consideration of nonspecific urethritis, one does well to bear in mind a number of things regarding the peculiar reactive behaviors of the anterior urethral mucous membrane. For it is from this expanse of mucosa that almost all purulent discharges appearing at the external urinary meatus

arise. This columnar-lined surface has a very rich capillary supply which is quite near the urethral lumen, so close, indeed, that but little irritation is required to bring about an outpouring of defensive polymorphonuclear leukocytes into the urethra. These, together with the mucous secretion of the urethra itself, combine to form what we call pus. This defensive or purging response occurs as the result of very slight causes in some individuals and, in others, the mechanism is far less delicate. The exciting factor may be the irritative discharges from an infected area elsewhere in the tract; it may be some systemic disease, a lowered resistance to bacteria normally present, the introduction of new types of bacteria, direct trauma to the mucous membrane itself either by instruments or chemicals, the ingestion of foods, drugs, or other substances, whose excreted end products irritate; or it may be result of undiscoverable causes.

CHART IX  
AGE INCIDENCE OF NONGONORRHEAL URETHRITIS



With so great a number of possible causes for purulent discharge from so sensitive a mucous surface the wonder is that the malady is not far more common than the careful urologist knows it to be. And it is probable that even he does not really appreciate its true frequency, for he is called upon to study only those who have enough discharge to be seen by the patient. The less obvious discharges escape the observation of both. One who studies many smears of supposed urethral mucus in patients presenting no macroscopic discharge is sure to be struck by the frequency with which he observes large numbers of leukocytes in the seemingly normal secretion.

The general skepticism regarding the permanent and, usually, speedy clearing up of the discharge in such cases, was born of an attitude of mind that thought solely of the urethra and failed to project itself beyond the thing it saw. It centered its attention upon responses and overlooked causes with results that were to be expected. One cannot obliterate permanently the normal responses of such sensitive mucous membranes if he

ignores the causes of them. With the removal of the cause the local reaction to it ceases with promptness, as a rule, and cure attends. However, there often persists a mucosal hypersensitiveness that makes recurrences of discharge from other and slighter causes of not infrequent occurrence. Consequently, it is not wise to assume that subsequent attacks are always due to the same etiologic factors.

As cure is dependent entirely upon the removal of the cause wherever this is possible, it is obvious that the first call is a diagnostic one. And it is not always a simple matter to determine the exciting influence. In fact, it so often occurs that a seemingly obvious cause is not the true cause, that one does well to establish a routine of procedure in the study of these patients, wherein he does not satisfy himself that he has answered the problem until he, also, has proved the absence of other possible causes.

To this end, a most carefully taken history is of the utmost importance for in it one rather commonly finds the solution to his problem. The consumption of quantities of alcohol perhaps of doubtful quality, sexual exposure in strange quarters particularly near a menstrual period, previous prolonged traumatic urethral treatments, a reduction in the size of the urinary stream, the eating of foods rich in oxalates, a recent influenzal attack, tonsillitis, things suggesting a possible glycosuria, the use of venereal disease prophylaxis, and a host of others that may be the exciting factors—all these should be searched for.

Following this there should be a careful microscopic study of the urethral secretion the interpretation of which is discussed under that heading an examination of the external genitalia and a study of the chemical and microscopic character of the first and second glasses of urine. This should be followed by a careful study of the prostatic secretion if no contraindications to such a study are present. At least 75 per cent of all nonspecific urethral discharges are secondary to prostatic infection and, where such infection is revealed in the absence of a recent gonococcal attack, often in the presence of such a history, the cause of it should be looked for in infections of the teeth and tonsils.

Where no contraindications present themselves it may be well to determine the presence or absence of urethral stricture. This is particularly important in the presence of large numbers of epithelial cells in the urethral discharge. An effort also should be made to rule out infections of the seminal vesicles and Cowper's glands. Even that highly misleading instrument the endoscope may need to be brought into play.

**Treatment**—Predominantly, treatment rests in the removal of the cause. As a rule no amount of local treatment to the urethral mucosa will obliterate the discharge permanently so long as the exciting cause remains. Usually the urethral discharge will disappear when the cause has been banished unless there has occurred a marked change in mucosal cell type as the result of prolonged urethral trauma of an instrumental or chemical nature.

In those recent cases where no deeper pathology can be demonstrated or in which the exciting cause has discontinued it usually is a simple matter to clear up the urethral condition by the injection of some one of the milder substances generally used for urethral treatment. Of these mild protein silver in 5 per cent solution is perhaps, outstanding in its effect.

It is the writer's custom to carry out a preliminary urethral wash with 1:8000 permanganate of potassium solution and follow it with a 5 per cent mild protein silver solution, which is retained for five or ten minutes. Such a treatment carried out on successive or alternate days for three or four treatments generally suffices. If success does not follow this course of treatment, a 5 per cent neosilver solution is ordered for the patient and he is instructed to inject and hold it in his urethra five minutes twice a day.

In the presence of a long-standing urethral discharge associated with the desquamation of much epithelium the story is not so simple. Such patients almost always are the victims of urethral stricture or have had the covering of the anterior urethral mucosa changed to squamous cells by much chemical trauma. These cells are formed in large numbers and they desquamate freely. At times, the discharge is composed of mucus in which are suspended countless epithelial cells with no leukocytes. At others there are about equal numbers of both. Under the latter circumstances, improvement may follow the careful use of mildly stimulating urethral injections. These, however, should be discontinued if the leukocytes disappear, leaving only the epithelial cells in the discharge. Where only epithelial cells are present, in the absence of stricture, time and the natural reparative processes of the mucosa seem to be about the only things that give results. To continue chemical applications only makes matters worse and more prolonged. If convinced that such a discharge is not really pus, most patients can maintain mental equilibrium while Nature gets her chance.

Patients who have had a severe nonspecific urethritis, or who have had much chemical treatment for gonorrhea, are particularly liable to increases in urethral secretion the morning after intercourse or the drinking of much alcohol. Such secretion may be mucus or it may have a number of leukocytes in it. In either event, it usually disappears within twenty-four hours without treatment. If not, a few treatments such as have been described above usually will clear it up. As time passes these attacks become milder and milder until they cease altogether.

One always should be on the alert in the presence of yeast cells in the discharge of nonspecific urethritis. It is not uncommon for diabetics to develop urethritis. In them this is customarily associated with much reddening of the meatus or, if there is a redundant prepuce, balanoposthitis. The cure of the urethritis rests in the control of the diabetes.

During and after influenzal epidemics urethritis showing many pneumococci in the discharge is of common occurrence. Many of these individuals also have a prostatitis. Some do not, and the urethritis in them usually responds promptly to local treatment of the urethra.

Urethritis following coitus with a woman having an irritating vaginal secretion at or near menstruation likewise is promptly cleared up by local treatment. Its prevention rests in avoidance of coitus with the woman near her menstruation or in wearing a condom at these times.

One does well to palpate carefully the glans penis and urethra for areas of induration and, where these are found or any urethral ulceration is discovered, to carry out careful dark-field studies lest a urethral chancre be overlooked.

Occasionally, the patient with a moderately profuse mucoid discharge

in the absence of any demonstrable cause shows no improvement from the treatments previously discussed under such circumstances the use of an astringent injection into the anterior urethra twice a day for several days usually results in a cure

In the presence of a mucoid discharge the fluid should be searched in the fresh condition for the *Trichomonas vaginalis*. Usually this parasite infests the prostate as well as the urethra. If so it should be treated by prostatic diathermy and the injection into the urethral canal of 1 3000 neutral acriflavine. In the absence of prostatic infestation the latter is quickly curative. Treatment also should be given to the patient's sexual partner.

### STRICTURE OF THE URETHRA

A urethral stricture is a definite narrowing in some portion of the urethra. As true stricture hardly ever occurs in the posterior urethra one almost might confine the definition to the anterior urethra alone. There do, however, occur congenital valves and bands in both portions of the canal and, at times, the congenital narrowings are due to tissue almost fibrous in character. While these differ little in their effects from what we have become accustomed to call strictures there has of late developed the habit of considering them as more or less divorced from the subject of urethral stricture, and viewing strictures as narrowings that occur as the result of the contraction of fibrous tissue having its origin in some inflammatory process of the deeper layers of the urethral mucous membrane. This inflammatory process may be due to disease or trauma.

The diseases most commonly acting as the *inciting agent* for the changes that eventuate in stricture formation are gonorrhea, tuberculosis and syphilis. Other ulcerative conditions of the urethra may act in the same way, but such ulcerative processes almost never are encountered except as the result of burns from injected chemicals.

Far more than 90 per cent of all urethral strictures are the sequelae of gonorrhea, sequelae in the sense that the inflammatory process that laid down the cells in the submucosa which eventually became fibrous tissue, with its inherent tendency to contract occurred during the course of gonorrhea. It generally takes three years or more for sufficient contraction to cause urinary symptoms. There is much evidence to suggest that even the postgonorrheal stricture is really a traumatic affair. Those who have watched the stricture problem for a number of years have been impressed with the fact that postgonorrheal strictures have grown fewer and fewer as the years have passed. Thirty years ago they made up a large portion of urologic practice, particularly in dispensaries. Today, they are so scarce as to make it difficult to locate enough of them for student teaching purposes. We cannot explain this by any change in gonorrhea or in human beings, both have remained the same. The only thing that has undergone any change in this regard is that year after year the treatment that has been given for the disease has grown less and less traumatic. That the traumatic quality of treatment administered to the gonorrheal urethra is the determining factor in stricture formation is amply shown by this and the fact that wherever one finds a patient with a postgonorrheal stricture, he easily obtains a history of much traumatic treatment on the part of either the

patient or the physician. Stricture formation may follow follicular abscesses, and such probably will be the direct cause of most of those found in the future. Even this does not altogether remove the trauma factor, however, as follicular abscess very rarely occurs in the absence of trauma to the urethra or penis during active gonorrhea.

Wherefore, it well may be concluded that postgonorrheal stricture is a matter of treatment and not of disease and, as such, is almost entirely preventable. The same applies to those strictures resulting from the injection of caustic chemicals for prophylaxis against gonorrhea or for other purposes. Deep anterior urethral trauma produces round-cell infiltration, and

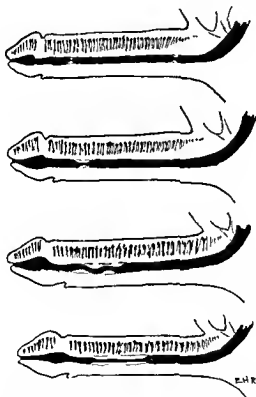


Fig. 184.—Illustration of four types of fibrous stricture of the urethra. These may be located in any portion of the anterior urethra but are more common in the bulbar region.

such infiltration usually eventuates in fibrous tissue formation and contraction. The posterior urethral mucous membrane has not the loose submucosa that maintains in the anterior urethra and deep trauma of it exerts its effect in the firmer structures upon which it lies and in which there is not the great opportunity for submucosal round-cell infiltrations.

Regarding the location of the urethral strictures, it used to be said that they were more common in the bulbar urethra because in that part of the canal drainage is not so good. So far as the question of location is concerned the statement is true enough. The mistake is in attributing to poor drainage what unquestionably belongs to trauma, for, in the passage of sounds and like instruments, a thing that even yet is carried out by some

physicians during the presence of the gonococcus, the bulbar portion of the canal is most subject to injury. Particularly is this so at the bulbomembranous junction, in the region of which most tight strictures are found. And this, likewise, is the probable explanation of the fact that, where several strictures exist, the ones nearest this region are the smallest in diameter. For one rarely, if ever, finds such an arrangement of stricture formations in individuals who have not had sounds passed while the gonococcus was present. For the sake of the patient's future, one well might twist an old saying into, "Spare the rod and save the urethra."

In contradistinction to the rather common arrangement and location of postgonorrheal strictures, those due to the injection of caustic chemicals usually are in the penile urethra, and those in front frequently are as tight



Fig 185 Urogram showing a most intricate entanglement of multiple urinary fistulae (Herman The Practice of Urology W B Saunders Co Philadelphia)

as, or tighter than, the more posteriorly placed ones. They do not, in any sense, follow the rule of postgonorrheal strictures in regard to caliber.

Stricture also may result from direct trauma to the urethra from without. Because of the great mobility of the penis, such injuries most commonly expend their force on the fixed portion of the canal between the penoscrotal angle and the bulbomembranous junction. Consequently, such strictures are rarely anterior to the former point. While these strictures are usually single and broad-based, they may be multiple and narrow-based.

Scars left by the healing of tuberculous or other ulceration may occur at any portion of the anterior urethra, and it occasionally happens that marked tuberculous ulceration may even cause the formation of heavy scar bands in the posterior urethra that markedly interfere with urination.

Much used to be said about the so called "spasmodic stricture." This is



not a stricture, but a thing that any nervous patient or any heavy-handed, speedy physician may cause. It is a more forcible contraction of the cut-off muscle, a sort of insult resentment. If one tries to pass instruments of any size quickly through this sphincter he causes spasm and notes a resistance to the passage of the instrument. He may feel the same thing if he tries to pass a finger quickly through the anal sphincter.

Strictures have been classified variously as single or multiple, annular, narrow, broad, tortuous and under like titles of a highly descriptive nature. They also have borne names indicative of location.



Fig. 186.—Late results of urinary back pressure due to urethral strictures of extremely small caliber. (Redrawn from Morris.)

**Pathology.**—Starting as a submucosal accumulation of round-cells which cause little or no early narrowing of the urethral lumen, the potential post-gonorrheal stricture passes through various stages until it reaches true scar tissue. The inherent quality of scar tissue is reduction in bulk by contraction, and the extent to which it obstructs the urethral lumen depends upon its contraction and location. If it entirely surrounds the canal, which unfortunately it frequently does, it very commonly contracts almost sufficiently to occlude it, so that the slightest mucosal swelling may cause complete obstruction to the passage of urine. Thus, it may cause varying grades of interference with urination depending upon its character.

It is apparent that upon rare occasions, there may develop a large amount of elastic tissue which causes the type of stricture known as resilient. Such a stricture from a treatment standpoint, presents different features than are usual with most strictures for, no matter how often or how greatly it is stretched it almost immediately goes back to its former degree of urethral obstruction. On the other hand the usual type of tissue making up a strictured area shows a very slow tendency toward recontraction. In fact it usually is reduced in quantity and contractile quality by the pressure of repeated gentle stretchings.

One of the outstanding misfortunes regarding the urinary conducting structures is that they were not built with a view to withstanding the influences of back pressure. And it is because of this weakness that urethral stricture exerts its most baneful influences upon the tract. The

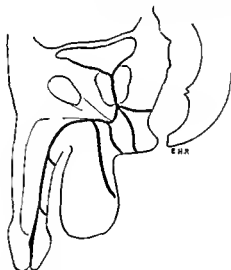


Fig 187 ~Diagram to illustrate the more common directions taken by urinary fistulae

earliest evidence of this is the atony of the urethral musculature immediately proximal to the obstruction so that the canal dilates in this region. Concomitant with this urethral stretching there is a change of the mucous membrane. It markedly thins out, loses its columnar cells and instead develops a protective layer of squamous cells. This change makes for local weakness and favors urethral rupture under the stress of great straining at urination. As the result of this the various grades of urinary extravasation may occur into the surrounding tissues and as there usually is much infection proximal to a tight stricture abscess formation is the rule where such extravasation takes place. The danger to the patient's life depends upon the amount of extravasation, the type of infection and the speed with which drainage is established either spontaneously or surgically. In certain infections notably those by the gas bacillus the mortality is extremely high. The more sluggishly acting bacteria do not carry such a high mortality and in neglected cases may cause the establishment of multiple fistulae through spontaneous rupture on the skin surface.

Aside from the urethral pathology resulting from the stricture, the

bladder may, and often does, show the influences of back-pressure and, rather commonly, infection. In long-standing cases, great reduction of kidney function, as the result of back-pressure, and dilatation of the ureters and kidney pelves is not uncommon. There may be an associated pyelonephritis or other renal infection, often having a fatal outcome.

**Symptoms.**—The symptoms of urethral stricture, even from the same amounts of obstruction, show the widest range of variation in different individuals and in different races. The negro usually experiences little discomfort from a stricture as long as he can manage to urinate at all, whereas the white man rarely has the hardihood to endure his symptoms to such an extremity.

Probably the most common early symptoms are urethral discharge composed mostly of mucus and epithelial cells, and some slight change in the caliber of the urinary stream. As the strictured area narrows, the interference with urination becomes more and more marked until, perhaps, the urine is passed a drop at a time, or there may be some urethral bleeding from time to time, and some individuals may have one or more attacks of epididymitis. There is a nocturnal frequency which, if cystitis develops, becomes more pronounced and interferes with sleep. Febrile attacks are common in advanced cases, as, also, are evidences of interference with renal function.

**Diagnosis.**—The presence of stricture may be suggested by the character of the urethral discharge or the change in the urinary stream. As previously has been pointed out, it is proved by the demonstration of narrowing or obstruction in the course of the anterior urethra. The usual instrument employed for the demonstration of urethral narrowings is the acorn sound or the bougie-à-boule. The largest one that will enter the meatus is advanced until it meets an obstruction. Decreasing sizes then are used until one is found that passes through this obstruction. The shape of these instruments is such that they will pass more readily in one direction than the other, so that a slight obstruction that allowed an instrument to pass becomes a definite hang on the shoulder of the bulb as it is withdrawn.

With care, the bulbar sound can be passed through the membranous urethra if no stricture prevents. As strictures at the bulbomembranous junction easily can be overlooked, it is well to make sure that either the bulbar sound or, better, the tip of the regular urethral sound is beyond this point to avoid such an error.

**Prognosis.**—The prognosis of stricture depends upon the care given it, the damage done before treatment is started, and the resistance of the patient to infections. In the negro race it is not good, as such a great percentage of them do not continue treatment long enough for full dilatation to be accomplished. From the standpoint of permanent cure it is doubtful. The old saying, "Once a stricture always a stricture," has much of truth in it. The tendency to recontraction remains even after overdilatation, so that patients with stricture should have their urethral caliber studied at least once a year as long as they live.

**Treatment.**—The treatment of urethral stricture depends upon the type of stricture, the type and condition of the patient, and the associated complications or results. To frown on surgical treatment and say that one always can avoid it in a passable stricture, would be as much of a mistake

as to say that the cure of stricture rests in operative surgery. For operation does not really cure stricture unless it removes entirely the area of the stricture. In the operation of urethrotomy one merely splits the strictured area. The same potentialities for future contraction exist and the same need for the future passing of sounds holds as is the case with instrumental dilatation. There are cases in which operation is urgently needed others in which it is advisable and an overwhelmingly greater group in which operation is a mistake.

The proportion of patients in whom operation is not needed has grown progressively larger in recent years. Much of this is due to the fact that one does not see in office practice strictures of a type that were common years ago. In city hospitals and dispensaries having large numbers of negro patients, conditions frequently are reversed and one time after time has to take a different view of the entire subject. Often it is the better course to carry out a urethrotomy on those who persist in neglecting treatment of tight strictures. The results of urethrotomy last much longer than do the lesser grades of dilatation possible with such patients. In the presence of urinary extravasation operation is imperative.

While it may fall to the lot of the office worker to decide upon the necessity for operation he should not go into a panic over the first attack of retention, unless it is associated with urinary extravasation. For, with patience, gentleness, and the proper instruments, impassable strictures are of the greatest rarity. It is seldom that second or third attacks of urinary retention upset the patient as does the first, and the condition has not so much the appearance of a great emergency.

In the presence of complete or almost complete retention with great distention of the bladder, one often is faced with much the same problems as present themselves in acute urinary retention as the result of prostatic obstruction. He has to think of the patient's cardiovascular condition from the standpoint of the sudden drop of blood pressure resulting from the too rapid emptying of such a bladder, and he has to think of the possibility of intravesical bleeding from the sudden relief of expanding pressure.

In robust individuals, little fear need be held regarding the prompt emptying of a bladder that has not been distended for more than a few hours. In all patients with prolonged retention and in weak individuals with any distention, the relief should be very slow. The removal of even so small a quantity as one ounce gives great lessening of discomfort and pain. It has been shown however, that the first half-ounce of urine is the dangerous portion. The older method in such patients was to pass a filiform into the bladder and fasten it there. Within a few moments of its passage urine begins to drip alongside the filiform and the bladder very slowly empties itself without quick reduction of intravesical pressure. The writer for years has used either a No. 3 or a No. 6 French, olive tipped ureteral catheter for this purpose and has found it far better than the filiform.

If great difficulty is encountered in passing a filiform through a tight stricture in the presence of marked retention it should be kept in for twenty-four hours. Its removal may be followed by the impossibility of passing another, while the gradual dilatation caused by its continued presence makes it a simple matter to pass even a larger instrument on the fol-

lowing day. No matter how urgently relief may seem to be demanded, one never should neglect the most careful aseptic precautions. The glans should be thoroughly cleansed, the urethra gently washed out as well as it can be, some antiseptic solution should be held in it for several minutes, and time should be taken for a careful sterilization of the instruments as well as the physician's hands.

In those cases where quick emptying of the bladder is not contraindicated it is well to use the woven filiforms that can be attached to either the Philips or LeFort catheter. The temptation to carry out too great dilatation of the stricture at the first sitting should be combated. Strictures are peculiar things. Many of them resent being forced too greatly, and the liability to infection is greater under such circumstances. One always should stop short of bleeding, for the stricture that has been caused to bleed has had further trauma done it and a way has been made for greater mucosal infiltration. The more gently a stricture is used the better and more lasting are the results of its dilatation.

The simple passage of a filiform through a stricture that has allowed urine to escape only a drop at a time, usually will make it possible for the patient to pass a small continuous stream within a few hours, if the stricture lumen has not been greatly traumatized. Even this little improvement seems great to the patient and renders him quite content to wait a few days for further dilatation. If one is sufficiently gentle and causes no bleeding, there is no need to wait for the old arbitrary five-day interval in the early stages of stricture dilatation. It can be done on alternate days with perfect safety to the patient. As the caliber becomes of a more comfortable size, it is well to make the intervals longer or, if one has caused bleeding at a previous treatment, it may be better to skip the next treatment. It is a good rule never to increase more than two sizes of the French scale at a treatment, and, if the stricture is firm or bleeds easily, one size is safer.

As one carries his dilatation up to the sounds of larger sizes he should not allow a tight urinary meatus to prevent him from obtaining complete dilatation. A meatotomy is such a simple thing for both patient and physician that it should be done even if the sound passes but causes painful stretching.

The choice of instruments in the handling of the various types of urethral stricture is a matter of much importance to the success of the treatment. In the presence of stricture of very small caliber one of course must resort to filiforms. These, as previously has been pointed out, are either woven ones or made of whalebone. If the former can be passed through the strictured area one is in a better position than if only the latter can be passed. The woven follower is a far safer instrument than is the Gouley tunneled catheter that is passed over the whalebone filiform. It at times happens, however, that, try as one will, he is unable to make a woven filiform enter the bladder and, yet, when he turns to the use of a number of whalebone filiforms in the urethra at one time, he has little trouble in getting one of them to pass. If so he should resist the temptation of using the larger sizes of Gouley catheters over it.

A very good rule to make is to use nothing but flexible instruments where sizes less than No. 20 F. are used, and rigid ones above this size. The tips of sounds of the smaller sizes are so small that it is a simple matter to

make false passages with them. One may carry his dilatation up to No. 20 F with the smaller sizes of Philips catheters or with the utmost care may even use the LeFort sounds. He may use the olive tipped bougies and may even continue with these into the larger sizes, inasmuch as many patients experience less discomfort from the passage of flexible instruments.

It is better to carry the dilatation of strictures to a point where the sound puts the entire penile urethra on a stretch, than to stop at less than full dilatation. When this size is reached it should be passed once every two weeks for several times, then a month later and, if there is no sign of recontraction, at three to six months intervals for a year or more. The patient then should be told that he has been relieved and not cured, that the probabilities of recontraction are great and that he should have a full sized sound passed at least once a year for life.

### INJURIES TO THE URETHRA

Injuries to the urethra may occur from both external and internal violence. The great mobility of the penile portion of the urethra definitely limits the likelihood of its being injured by external force. In fact, aside from gunshot and knife wounds, this rarely takes place. Cases have been reported, however, wherein the entire body of the penis was pushed loose



Fig. 188.—Urinary extravasation through a rupture in the bulbar portion of the urethra and its passage into the perineum and scrotum.

from the skin surface and upward under the skin of the abdomen by great crushing force. Upon rare occasions the urethra has been cut through by encircling bodies, particularly rubber bands. Occasionally the urethra of the erect organ is injured.

Injury to the bulbar and membranous portions of the urethra is by no means so rare. These portions, being firmly fixed, do not enjoy the protection of mobility, and they frequently are torn by bone fragments in fractures of the pelvis. A good number of injuries to the bulbar urethra are to be ascribed to perineal blows, such as falling astride of unyielding bodies, kicks and like forces. The posterior urethra likewise may be injured in fracture of the pelvis.

Injuries from internal violence are usually to be attributed to the unskilled use of urethral instruments or the force of urine due to a tight urethral stricture. These latter breaks in the urethral mucosa may occur at any portion of the anterior urethra, but, since strictures are more common in the bulbar urethra, they usually take place in that portion of the canal.

**Pathology**—The injury to the urethra may range from slight bruises or breaks in surface to the most severe contusions or lacerations, with complete severance of the canal. As a rule, the roof of the urethra escapes

separation. Where complete urethral rupture does take place the break usually is at either the anterior or posterior faces of the triangular ligament.

**Symptoms.**—Aside from the pain at and following the injury, the most common symptom of urethral trauma is bleeding. This bleeding occurs independent of the act of urination and varies in degree with the size of blood vessels ruptured and the hemorrhagic tendencies of the individual.

Urination may be but slightly interfered with or it may be quite impossible of accomplishment. Particularly is this latter the case in the presence of great laceration or complete separation.

The amount of tumefaction varies with the amount of hematoma and urinary extravasation. As a rule, the extraurethral bleeding and urinary extravasation follow the fascial planes, but these may be so torn as to offer no clear-cut indication as to the site of the urethral break.

It is to be recalled that fluids escaping from the prostatic urethra infiltrate the pelvic and ischiorectal spaces, that those escaping between the layers of the triangular ligament form a tense perineal tumefaction which may force either forward or backward, and that those escaping into the penile sheath may be limited to the penis or may escape into the scrotal tissues. (See section on Extravasation of Urine.)

**Diagnosis.**—It usually is a simpler matter to determine the fact that a urethra is injured than it is to settle the exact location of such a break. Often, the complete diagnosis is not made when both of these points are settled, for there may be a rupture of the bladder as well. Thus, in the presence of fracture of the bony pelvis great care should be taken that the more obvious injury does not cause oversight of one that may be far more dangerous for the patient.

The history of injury, bleeding from the urinary meatus, tumefaction and varying degrees of interference with urination, seldom leaves much room for doubt regarding either a break in mucosal surface or great laceration.

**Course and Prognosis.**—Both the course and prognosis depend upon the location and extent of the injury and the promptness and intelligence of the treatment applied, and seldom is more diagnostic skill and therapeutic judgment demanded. The natural tendency to plunge into the doing of what may be ill-advised procedures must be combated on the one hand, and, on the other hand, there must be exhibited an alertness and courage that does not allow things to drift too long. The immediate dangers to the patient must not be viewed too lightly, nor should the remote consequences of even minor injuries be forgotten.

Keyes, in citing Guyon's classification of urinary injuries, sums the matter up in his usual terse manner as follows:

"1. Mild injuries to the pendulous urethra in which trauma is succeeded by a sharp urethral pain, slight bleeding, and a few painful urinary acts, are not likely to be followed by any serious consequences, except traumatic stricture, which is almost inevitable.

"2. Moderately severe injuries to the pendulous urethra are characterized by free bleeding, painful and impeded urination, and a hematoma of some size. The chief danger here lies in infiltration and periurethral sup-puration and later traumatic stricture.

"3. In severe injuries and in most perineal cases complete retention is

the prominent symptom. It can rarely be relieved otherwise than by external urethrotomy.

In any case traumatic stricture may be predicted—a condition for midable both in its rapidity of onset and its rebelliousness to treatment.

"The immediate mortality from rupture of the urethra is low. Terrillon records 12 deaths in 170 cases chiefly from uremia, septicemia and hemorrhage."

**Treatment**—The treatment of the milder forms of urethral injury that involve only the penile urethra should be entirely expectant. Assuredly, one should make no effort to pass an instrument into the urethra of such a patient unless he shows definite obstruction to the urinary stream. For it is a simple matter to increase the extent of the mucosal break by even the most careful intraurethral manipulations. Rest, antiphlogistic measures and the oral administration of urinary antiseptics alone are indicated. If in these cases urinary extravasation does not occur the condition usually clears up rather promptly without further complications.

It should not be forgotten that most cases wherein there has been real trauma to the corpus spongiosum and urethral wall later will develop a stricture. Such strictures are by no means as slow in forming as are those of gonorrheal origin and urethral dilatations should be done by the expiration of ten weeks.

In the presence of severe injuries involving any portion of the urethra an effort should be made under aseptic precautions to pass a soft rubber catheter into the bladder. Hydrostatic irrigation of the urethra never should be done and, if efforts are made to cleanse the distal portion of the canal prior to the passage of the catheter, they should be limited to washings almost devoid of pressure. If the catheter passes it should be tied in and kept there for several days. It then should be removed and another one inserted if the injury has been extensive.

The need for operative interference depends upon urinary obstruction, infiltration and infection. To delay operation in patients in whom these have occurred is to subject them to grave danger. Often life and, usually, the restoration to normal function depend upon the promptness with which surgery is done, as well as upon its skill and thoroughness.

In all patients the probability of stricture formation should be borne in mind and they should not be dismissed from observation for several years thereafter.

#### URETHRAL TUBERCULOSIS

The resistance of the urethra to tuberculous infection is outstanding. Even in the presence of marked urinary, as well as genital tuberculosis, the urethral mucous membrane escapes infection in all but an extremely small number of patients. Though one rather commonly sees marked infection of the posterior urethral mucosa in the presence of vesical infection, autopsy records usually fail to record this as true tuberculous infection. The speed with which it usually clears up after nephrectomy indicates that it is merely a mucosal reaction to an extremely irritating urine.

There is, however, a number of cases of true tuberculosis of the urethra on record. Dr. Alexander Randall found one such case at autopsy. The lesions were composed of typical mucous membrane tubercles with the



characteristics of those so commonly seen in the tuberculous bladder. There also were a number of small, punched-out ulcerations; in the bases and margins of which numbers of tubercle bacilli could be demonstrated on tissue section. There was no scar formation.

Scar-tissue formation does occur in advanced cases, particularly when the anterior urethra is involved, and later may eventuate in a filiform stricture. Calcareous infiltrations with true pipe-stem urethra have been reported. Caseation with considerable destruction and fistula formation, likewise, has been recorded.

The etiology is that of tuberculosis elsewhere in the urogenital tract, of secondary origin. Walker has reported a patient whose only discoverable tuberculous lesion was urethral. This was interpreted as having been caused by direct inoculation from his tuberculous wife.

**Symptoms.**—There are no symptoms characteristic of tuberculous urethritis that serve to differentiate it from other types of active urethral infection. The urinary disturbances associated with it usually are due to the trigonal and vesical infection from renal tuberculosis. While there may be blood-stained semen, this is so common with nontuberculous lesions of the posterior urethra as to arouse no suspicion, as a rule. Urethral pain and burning after urination may be marked, but even this is a common symptom of other conditions.

**Diagnosis.**—The diagnosis usually rests upon marked urethral symptoms in association with known urogenital tuberculosis and cysto-urethroscopic study. In the presence of anterior urethral involvement, it should be possible to demonstrate acid-fast bacilli in the purulent discharge, although this rarely is done.

**Treatment.**—Largely, the treatment of urethral tuberculosis is that of the associated lesions. Relief has been given in some cases by superficial fulguration to the ulcerated areas. Where urinary pain is most acute, relief may be had by alkalinization of the urine, though this, at times, is difficult to bring about. The injection of a mixture of 3 per cent liquid guaiacol and 5 per cent calomel in olive oil into the urethra and bladder by syringe, often relieves pain. The same can be said of the local anesthetics, such as borocain, nupercaine and the like.

Instrumental dilatation of the canal should be delayed until healing has taken place wherever possible. It is not generally recognized that not a few such patients are greatly harmed by such procedures and that the precipitation of a miliary tuberculosis is by no means an impossibility. Upon the rarest of occasions, it may be a wise procedure to divert the urinary stream by means of cystostomy.

#### URETHRAL DIVERTICULUM

Diverticulum of the urethra is either congenital or acquired. Congenital diverticula not uncommonly start as retention cysts which eventually open into the urethra. They also may be due to excessive development of a mucous channel emptying into the canal, such as the crypts and glands of the anterior urethra, the duct of Cowper's gland or the sinus pocularis. They practically all spring from the under surface of the urethra.

Acquired diverticula usually are back-pressure influences upon some

point of weakness in the canal. Frequently, they take place at a point of injury or at the site of a former abscess.

**Diagnosis.**—The diagnosis of diverticulum of the anterior urethra usually is a simple matter owing to its swelling during the passage of urine and its disappearance thereafter. If, however, the cavity is filled with a stone such dilatation and collapse is not so obvious, if it occurs at all.

Diverticulum of the posterior urethra does not lend itself to such ready diagnosis, as a rule, and usually is discovered only through the x-ray study of opaque fluids injected into the urethra. At times, the diagnosis may be made by cysto urethroscopic study alone. As stone formation is more common in diverticula of the posterior urethra, the diagnosis, at times, is made by the discovery of such stones in roentgenograms.

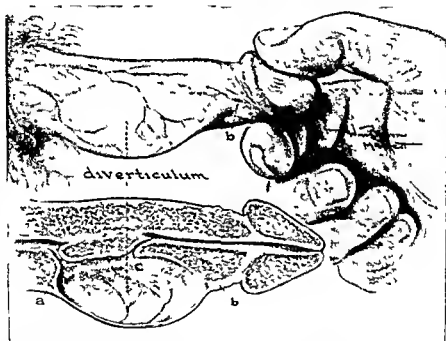


Fig 189.—Large acquired diverticulum of the urethra resulting from a traumatic rupture of that canal. (L. Herman: Traumatic Rupture of the Penile Urethra. Trans Am Assoc G U Surgeons, 1936.)

**Treatment.**—The treatment of diverticulum of the urethra depends entirely upon where it is, how large it is and what symptoms it produces. Those in the anterior urethra usually are easy of removal, but the possibility of fistulation is great and should receive proper consideration before operation is advised. Often, a patient is happier with a small urethral diverticulum than he would be with a urethral fistula at the same site.

Operation upon posterior diverticula is seldom a simple matter and the wisdom of it depends upon the size of the diverticulum, what it does and what it is likely to do. Even the presence of stone in some few cases can be disregarded, for, unless the cavity is removed entirely, it will only re-form. This, of course, does not apply to a large, symptom-producing calculus, which generally requires operative removal.

## URETHRAL CALCULUS

Urethral calculus is preponderately due to the lodgment of a stone in its passage from the bladder. Upon extremely rare occasions the stone may be a projection from the cavity of a urethral diverticulum, or a fragment broken therefrom. Stones, at times, form in the urethral dilatation proximal to a stricture of small caliber. Indeed it is not uncommon to feel definite incrustations in cases presenting old, neglected strictures on the passage of a sound. These, however, rarely go on to what we understand as stone formation.

Most stones passed into the normally calibered urethra pass through it with only a slight cutting pain. Most urologists of experience have seen such stones lodge in the posterior urethra and, more rarely, in the anterior urethra of individuals with normal urethrae. Lodgment is the rule if there is a pinpoint external meatus or a stricture.

Symptoms.—The symptoms produced by the lodgment of a descending calculus, of course, depend upon how large it is, whether or not it occludes the urethra and how nervous is the individual. It is rather unusual for such a stone to block the urethra entirely, so that no urine can pass. If total occlusion does take place there are urethral pain, perhaps bleeding, and all the signs of acute urinary retention.

If, on the other hand, occlusion is not so complete there is great difficulty in emptying the bladder, pain along the urethra, and usually some bleeding. All of these symptoms are of acute onset. Stones lodged anterior to the bulbomembranous junction can be palpated.

Diagnosis.—The diagnosis of urethral calculus is rarely difficult. The acuteness of the symptoms of a stone stopped in transit through the urethra is suggestive and their type is almost confirmatory. Palpation of the urethra, the calcareous click upon the passage of a suitable sound into the canal where possible, and perhaps x-ray study, leave little chance for error. Occasionally small calculi find lodgment in the floor of the posterior urethra with almost no resultant symptoms and, as a rule, they eventually are passed spontaneously.

Stones forming in the urethra or those projecting from a diverticular cavity do not give such a sudden symptom onset. Usually they are accompanied by the gradual onset of difficulty of urination due to a greatly reduced stream. The pain is seldom a prominent factor and there rarely is any bleeding. Most of these cases have almost a filiform stricture and, in them, the difficulty in passing a urinary stream of any size has long antedated the stone formation.

Treatment.—The treatment of urethral stone depends upon its size, its cause and the size of the canal distal to it. Small stones caught behind some natural point of narrowing usually can be removed by endoscopic procedures. Large stones that cannot pass require surgical removal, whether they are present symptom producers or not. If allowed to remain they increase in size and are a menace to the patient's future.

Small, nonobstructing stones caught behind a stricture usually can be allowed to remain until, by gradual dilatation, the stricture allows of spontaneous passage. Incrustations behind strictures disappear as the stricture is dilated. Lodgment behind a small external meatus may require meatotomy, though in this location it frequently is possible to break the stone

with urethral forceps. Moderate-sized stones in the posterior urethra usually can be pushed back into the bladder and removed or broken up.

As in the case of stones in other locations, there should be an analysis of the stone to determine, if possible, the physiologic faults underlying its formation. This determination will serve as a basis for treatment of the patient to the hoped for end that no more stones are formed. While this is possible in some cases, stone formation in general is not now sufficiently understood to lend itself to universal prevention.

#### URETHRAL TUMOR

Under the heading Tumors of the Urethra usually are included all of the benign excrescences so common in the posterior part of the urethra as well as the more serious malignant newgrowths.

Cyst formation in the posterior urethra is of common occurrence, so common, in fact, that the writer has seen several hundred such cases in his years of urologic practice. Kneise described them as urethral adenoids and Pilcher (1915) reproduced his drawing of them. Leo Buerger described them in 1911 and presented a most excellent illustration of them.

To the writer, the lesions have furnished a most excellent illustration of how circumstances may combine to make one honestly but grievously mistaken. For, during a number of years, he was firmly convinced that they were to be found only in patients with a mildly active tuberculosis elsewhere in the body. He probably never succeeded in bringing any great number of urologists to agree with him, which fact has turned out to be much to the urologists' credit. Today, he is of the same opinion as are the rest of the urologists. The story is well worth telling, if for no other reason than to show how one may be misled by a pyramiding of clinical experiences.

Back in 1912 and 1913, in ignorance of previous descriptions, the writer observed in nine individuals some cystic bodies on the mucous membrane of the posterior urethra. Tissues were taken from two of the cases. In one case, tubercle bacilli were demonstrated in the lesions and a pathologist pronounced the other "typical tuberculous tissue." These were reported in the New York Medical Journal of October 16, 1915 under the title of "New Growths of the Prostatic Urethra in Relation to Tuberculosis."

In the succeeding few years 42 more cases were encountered, of which 37 showed strong evidence of tuberculosis, usually pulmonary. Alexander Randall supplied the writer with three autopsy specimens from patients dead of tuberculosis. One of these specimens showed tubercle bacilli in the tissue. These cases were published in the August, 1917 Journal of Urology under the title of "Lymphoid and Cystic Bodies in the Urethra as an Evidence of Tuberculosis."

In the same journal in March, 1922 there were reported 75 cases, of which 83.3 per cent showed evidences of tuberculosis. Randall had encountered 16 more cases at autopsy, all of which were tuberculous. The lesions present, and their percentages, were as follows: Lungs 93.7, kidneys 12.4, bladder 12.4, intestines 37.5, pericardium 6.2, liver 12.4, fallopian tubes 6.2, spleen 25, and pleura 25.

One would say that such evidence should convince the most profound of skeptics. It did convince both Randall and the writer, but those who

had not seen, still held out. Since then we both have seen some hundreds of individuals, whom no one would consider tuberculous, with a large accumulation of urethral cysts. In fact, the observation has become so frequent that the writer has grown to think of tuberculosis in only those who show evident ill health.

The question that naturally arises is, "How could such a wealth of material be piled up to supply what later turned out to be only a clinical half-truth?" Part of the answer rests in the fact that so many of the early cases had, as a symptom, burning on urination, that our dispensary was combed for patients complaining of this symptom that really is a very common one in tuberculous patients. If as much time had been spent in studying the urethrae of individuals presenting chronic prostatitis, the negative side of the picture would have been discovered at an earlier date. No explanation of the autopsy side of the matter has presented itself, unless it be that the lesions really are more common in the tuberculous and that many of these tuberculous patients died at an age in which cysts are most common.

These urethral lesions occur at, or just distal to, the vesical outlet. They are more common on the anterior and lateral walls of the posterior urethra and less so in the postmontane fossa. Their chief importance is that they exercise a definite retarding influence in the cure of prostatic infections. In fact, it is practically impossible to clear up such an infection unless the cysts have been destroyed.

**Symptoms.**—In many patients having these lymphocystic lesions there is slight burning in the urethra on the passage of urine, the urine contains shreds, and almost invariably there is an associated prostatic infection. They bear no definite relation to a previous gonococcal infection.

**Diagnosis.**—Though one may suspect their presence from the patients' complaint of slight burning on urination and the fact that a prostatic infection fails to respond to a proper course of treatment, the diagnosis depends entirely upon their visualization by cysto-urethroscopic study.

**Treatment.**—In definitely tuberculous patients these lymphocystic lesions should receive no treatment, for they show a definite tendency to disappear as the patient's condition improves. Also, one does not carry out prostatic massage upon patients with active tuberculosis if he is wise, so that there is no need for destruction of the lesions as inhibiting factors in prostatic recovery.

In the nontuberculous patient the lesions can be destroyed best by electric fulguration through either the panendoscope or the cysto-urethroscope. Where such a method of removal is not available, they can be destroyed through the endoscope by the extremely careful topical application of 50 per cent silver nitrate. In such a method of treatment the utmost care must be taken to confine the solution to the cyst-bearing area alone and to remove any excess solution with a dry, cotton-wrapped applicator before the endoscope is removed from that area. Absolutely none of the fluid should be allowed to enter the vesical outlet, nor should it be used for those growths that are almost on the vesical side of the vesical outlet. It, also, is well to avoid touching the verumontanum in such application, not that the resultant destruction of this structure in any way harms the patient, but some future cystoscopist may be unwise enough to

inform the patient of its absence. The writer has seen two patients to whom this news had been imparted and has had great difficulty in preventing legal action against the doctors who destroyed these structures in them.

The erroneous impression that the verumontanum is an important sex center opens the way for a true sexual neurosis in which psychic impotence is almost sure to play a part. Even mixed juries are moved almost to tears by such an affliction as the supposed result of urethral vandalism.

### URETHRAL POLYP

True urethral polypi are rare in the male but less so in the female. Pseudopolypi are rather common in those in whom the Kollmann dilator has been used and occasionally are seen in those who have been subjected to much endoscopic treatment. These are found on the crest of the verumontanum and at the vesical outlet. They may be long thin pedunculated structures like true polypi or they may be in the form of long sessile ridges (Fig 190). They produce no definite symptoms and usu-



Fig 190 Polyp on the lateral wall of the posterior urethra

ally are found during cysto-urethroscopic studies for the condition that suggested the use of the instrument that caused them. They may be disregarded or they may be removed by fulguration.

Rugous folds and even elongated mucous tabs resembling true polypi occasionally are observed in women beyond the age of forty. These again cause no symptoms and can be disregarded.

True polypi have a structure almost identical with the fimbriae of papillomatous growths. They rarely are multiple and show no tendency to recur if their bases are destroyed with them. They probably do not undergo malignant change.

Symptoms—Polypi have been said to produce a vast assortment of sexual symptoms as has every lesion that occurs in the posterior urethra. It is conceivable that a urethral polyp if properly placed could cause involuntary seminal emissions. But it is very hard to see how it could cause loss of libido, impotence, premature ejaculation and the like and the probabilities are that they play only a psychic part if they do even that. Little effort has been made to differentiate between sexual disabilities due to psychic fixations and those due solely to local pathology. Often it has

occurred that the finding of some urogenital lesion has been used to explain every sexual symptom the patient had, despite the fact that most patients presenting such difficulties have no such lesions. A great number of patients need nothing more than some unusual sensations in the lower urogenital tract to start a number of psychosexual complexes working. Often, the mere thought that something is wrong is sufficient.

That urethral polypi at times produce sensory impulses cannot be denied. The nature of these sensations varies with the location of the polyp pedicle. If the polyp is long enough to be caught in the cut-off muscle grasp, very definite symptoms may be expected. The writer saw one such polyp interfere very much with the work of a factory executive. Attached on the floor of the posterior urethra about 1 cm. from the distal urethral sphincter, its extremity washed into the anterior urethra at urination. It produced no symptoms except in the position of leaning forward when seated at his desk. There, then, developed a constant feeling of traction on the penis, which was so pronounced as to take his attention from his work. There were no sexual symptoms whatever and the feeling of traction was removed at once on the destruction of the polyp.

Another individual, whose polyp started on the right lateral urethral wall just distal to the vesical sphincter and extended out beyond the verumontanum, complained of nocturnal emissions and a peculiar sensation along the entire canal. He was relieved immediately of both when the polyp was destroyed.

**Diagnosis.**—The diagnosis of such a lesion is dependent solely upon visual study of the urethra.

**Treatment.**—The treatment is removal by means of fulguration or by the careful application of 50 per cent silver nitrate solution, as advised under the consideration of Urethral Tumor.

#### URETHRAL PAPILLOMA

True urethral papillomata, that correspond in every way with the lesion as seen in the bladder, occasionally occur in the absence of bladder involvement. They, of course, are more common in association with

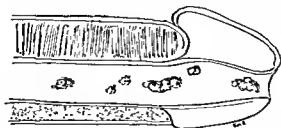


Fig. 191.—Multiple papillomatosis of the distal portion of the urethra.

bladder papillomata, which not infrequently extend to and into the posterior portion of the canal. Anterior urethral papillomatosis is occasionally seen. Usually these outgrowths are in the distal portion of the canal, but upon rare occasions the entire anterior urethra is studded with them.

While the posterior urethral papillomata show the same tendency to-

ward malignant change that is encountered in those of the bladder, those of the anterior urethra seem not to. At least, of the cases seen by the writer in previous years none has returned with urethral malignancy and anterior urethral malignancy is far rarer than are papillomata in this portion of the canal.

**Symptoms**—Posterior urethral papillomata may bleed but as a rule they do not, nor do they often cause other symptoms. Those of the anterior urethra usually are associated with excessive urethral moisture or true discharge.

**Diagnosis**—Unless the growths protrude from the urinary meatus as they occasionally do the diagnosis depends upon visual study of the urethra.

**Treatment**—The treatment is destruction, as it is the case with polypi. The smaller growths confined to the distal centimeter of the urethra at times may be destroyed by the careful topical application of glacial acetic acid after local anesthesia has been obtained. If the external meatus is small, this latter type of destruction should be preceded by a meatotomy.



Fig. 192—A small papilloma in the bulbar portion of the urethra

Only those growths that can be seen by opening the meatus should be treated thus. In other words, one never should use glacial acetic acid in the anterior urethra beyond the squamous lined fossa navicularis if he would avoid later stricture formation. Further, one never should lose sight of the tendency for such growths to recur, and such cases should be kept under observation for years.

#### MALIGNANT GROWTHS

Malignant growths of the urethra except as a part of either prostatic or vesical carcinomata, are rare. The type most frequently reported is the squamous cell carcinoma. Sarcomata of several types have been reported. Such tumors metastasize into either the inguinal or pelvic lymph nodes and beyond.

Malignant growths of the urethra are most commonly mistaken for inflammatory lesions at first. The chronicity of them and the progressive extension usually lead to suspicion as to the correctness of such a diagnosis and urge the wisdom of biopsy.



**Symptoms.**—Starting as manifestations of an inflammation of the urethra, there gradually occur more or less urinary obstruction and later, perhaps, fistula formation. Unless the diagnosis is made early there often is much destruction from sloughing.

**Diagnosis.**—The diagnosis depends primarily on biopsy suggested by the symptoms and by the appearance of the lesion.

**Prognosis.**—The outlook of patients presenting urethral malignancy is far from a bright one. Usually the growth has reached an inoperable state before the diagnosis is made. Small growths have been reported as cured by radium implantation, irradiation and surgery. These, however, are decidedly exceptional, for most patients have a recurrence within three years and at least 90 per cent of them die of the malignancy.

**Treatment.**—The treatment depends largely upon the size, location and type of the growth. Those growths in the penile portion are best treated by amputation. Those in the bulbar area lend themselves to no such complete removal and are best treated by either radium or x-ray or by surgery preceded and followed by irradiation. Those of a basal-cell type, having the lower grade of malignancy, of course offer the better chance for cure, while those of the prickle-cell type bear no such prognosis.

#### CHANCER OF THE URETHRA

Chancre of the urethral meatus is by no means of rare occurrence, and quite a few chancres within the urethra have been reported. Of 414 chancres reported by Fournier, 32 were in the urethra. It is probable that more would be found were they more diligently searched for, and it is equally probable that a number of our cases of syphilis, wherein an initial lesion was not discoverable, were cases of this type. The idea, so generally held, that chancre and induration are almost synonymous, has been the reason for many of them having escaped discovery. As previously has been said, one who has had much to do with the darkfield study of the fluid from penile sores is sure to develop the feeling that the less a sore looks like a chancre the more likely it is to contain the *Treponema pallidum*.

Urethral chancre is likely to be associated with a mucoid discharge that fails to change promptly on the institution of treatment. At times, there are one or more minute ulcerations to be seen in the fossa navicularis when the meatus is opened, and no one should assume that a darkfield study is not indicated because of the seeming innocence of these ulcerations.

In the presence of induration it is unusual that patients escape diagnosis. And the same is true in the presence of meatal chancre. An unvarying rule that no lesion of the penis should be considered other than probable syphilis until it has been proved negative by repeated darkfield studies, followed at an appropriate interval by serologic studies, would prevent some unpleasant later surprises.

By studying the urethral discharge by darkfield and later careful serologic studies Mazer and Friedman were able to discover cases of urethral infection where there had not been the least suspicion of its presence. Their work was done in the urologic dispensary of the University of Pennsylvania upon patients as these presented themselves for treatment of urethral infection, usually by the gonococcus.

## CONGENITAL VALVES

Many cases of congenital valve formation in the posterior urethra are on record and it is best to suspect such a condition in all male children having great difficulty in passing urine in the absence of an abnormally small external urinary meatus or a narrowing at the junction of the fossa navicularis and the penile urethra. In fact the two conditions are found at times to coexist. Thus if a meatotomy does not make possible a full sized urinary stream the posterior urethra should be studied.

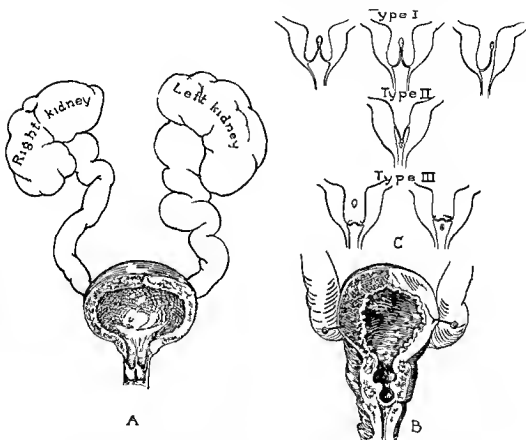


Fig 193 Different types of congenital valve formations of the posterior urethra and their back pressure effects on the bladder and upper urinary tract (Herman Principles and Practice of Urology W B Saunders Co., Philadelphia)

To allow such an obstruction to remain condemns the patient to back pressure dilatation of the ureters and the kidney pelves as well as seriously damaging the kidneys. In the hands of one skilled in cystoscopic procedures the diagnosis is so easily made and the destruction of the valve like bands such a simple matter as to cause little concern. It, however, should not be done during periods of acute infection associated with fever. Under such circumstances it is far better to resort to catheterization for the relief of vesical distention. This should be done with the same care that is advised in the gradual decompression of vesical distention at the other extreme of life. To empty such a bladder quickly particularly in a weak

ened child, may be disastrous. While these infected cases usually have high temperatures during acute seizures (which fever is due mostly to pelvic and renal absorption of toxic products) they do not have blocked ureters, but an almost or completely blocked posterior urethra. And, while quick relief of intra-ureteral and intravesical pressure should result in rapid subsidence of fever, the child frequently is safer with a day or two more of fever than he would be with an immediate relief of all back-pressure. Having gradually relieved the pressure, it is best to wait for a short time before destroying the valves by fulguration. Where there is no great vesical distention or acute infection these delays are not necessary.

## CHAPTER IX

### DISEASES OF COWPER'S GLANDS, PROSTATE GLAND, AND SEMINAL VESICLES

#### DISEASES OF COWPER'S GLANDS

**Acute Cowperitis**—Acute inflammation of the bulbo urethral glands seems to be confined practically to gonococcal infection. The chief etiology of extension from the urethra to the glands is the urinary back-pressure of a neglected urethral stricture or the forcible injection of fluids into the gonorrheal urethra. This phase of the subject is considered under the complications of gonorrhea.

Acute exacerbations of a chronic cowperitis may occur in the presence of urethral stricture and it may go on to the formation of recurring abscesses even in the absence of gonorrhea other than the one present when the gland first became infected but which long since has been cured. Under such circumstances the reinfections are due to pyogenic organisms from the urethra.

The description of these abscesses and their diagnosis differ in no way from that of gonorrheal abscesses.

**Treatment**—The treatment is preventive by proper attention to urethral stricture and the avoidance of high pressure urethral injections. In the presence of an abscess it should be incised and drained. It is best to avoid urethral instrumentation for a few days after incision of the abscess in the perineum. Occasionally, a fistula is formed between the gland and the perineum. Under such circumstances it is well to excise both the fistulous tract and the gland. Before doing this, however, the urethral stricture should be dilated gradually to full caliber.

**Chronic Cowperitis**—Chronic inflammation of Cowper's gland is not so rare as generally is supposed. At times it happens that gonorrheal infection of the gland takes place without the usual abscess formation. The infection then may smoulder along as a sluggish gonococcal one, or the gonococcus may disappear and infection be kept up by secondary bacterial invaders on the soil prepared by the gonococcus.

**Symptoms**—Aside from urethral discharge, shreds in the urine or both, chronic inflammation of Cowper's gland produces no symptoms. Such inflammation, however, should be suspected in every case of chronic anterior urethral gonorrhea as well as in chronic nonspecific infections of the canal in patients giving a history of a previous gonorrhea.

**Diagnosis and Treatment**—The diagnosis and treatment of chronic cowperitis are covered elsewhere. (See page 244.)

**Tuberculosis of Cowper's Glands**—Cowper's glands show a very decided resistance to the implantation of tubercle bacilli except as an extension from a contiguous tuberculous focus. Only one or two cases of primary involvement have been reported. It may be assumed, therefore, that involvement of the glands is excellent proof of other involvement. A

number of cases of involvement by continuity of structure have been reported.

*Symptoms.*—The appearance of a relatively painless mass at either side of the bulbar region, that gives real discomfort only in the sitting position, in the absence of gonorrheal infection should arouse the suspicion of tuberculous cowperitis. Particularly is this so in the presence of other urogenital tuberculosis. Unless incised, these swellings break down and show a tendency toward the fistulous formation so common to this region.

*Diagnosis.*—The history, the mass that definitely arises in Cowper's gland, the finding of tubercle bacilli in either the aspirated contents or the pus on incision, plus the usual complicating urogenital tuberculosis, leaves no doubt as to the diagnosis.

*Treatment.*—If, as hardly ever happens, the diagnosis is made of a primary infection of the gland, it should be removed in its entirety. Otherwise, incision should be made to allow free drainage and the patient placed on a strict antituberculous régime. Mainly, the treatment is that of the associated urogenital involvement.

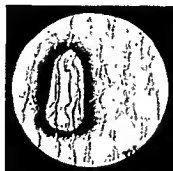


Fig. 194.—Cyst of Cowper's duct.

*Cyst of Cowper's Duct.*—Cystic dilatation of the duct leading from Cowper's gland is of very rare occurrence. The condition, however, has been reported a number of times, and the writer has seen it upon two occasions. In both cases the dilatation was unilateral and was of so characteristic a nature as to leave no doubt of its identity. It appears as an elongated swelling to one side of the floor of the bulbar portion of the urethra, covered with smooth mucous membrane and giving all of the appearance of a thin-walled cyst. (Fig. 194.)

Upon both occasions a slit was made in the mass with a fulgurating wire and a seemingly clear fluid was emitted as it collapsed. In neither case did it recur within the time of later observation, one at the end of two years and the other at about five years.

The condition in both cases was devoid of symptoms and was discovered in cystourethroscopy for other things.

According to Lowsley and Kirwin, English reported one case causing complete urinary retention with death, and Terraneus (1729) reported the case of a boy requiring repeated catheterization to relieve a retention due to this cause.

## DISEASES OF THE PROSTATE GLAND

**Gonorrheal and Postgonorrheal Prostatitis**—It probably is safe to say that every gonococcal infection of the posterior urethra brings about infection of the prostate gland as well. There are many who go much further than this and state that every gonococcal infection of the prostate is associated with a similar infection of the seminal vesicles. With the

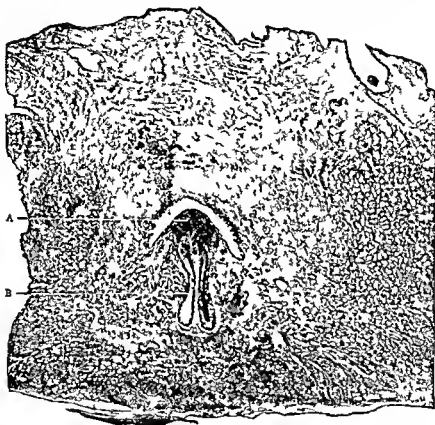


Fig 19: Cross section of the prostate gland giving an excellent idea of the complexity of this structure. It is really remarkable considering the endless number of small mucous spaces in the gland and the minute tubes through which they empty their contents that sufficient drainage could be established by massage to cause recovery from infection. The reasons for the length of time necessary for such cases are obvious. At A we see the verumontanum with the arched space of the posterior urethra surmounting it. At B are the cross cut ejaculatory ducts. (Courtesy of Dr. Henry H. Morton.)

latter the writer finds himself utterly unable to agree. He sees no biologic anatomic nor clinical reason to support such a view in more than 2 per cent of the cases of prostatic gonorrhea. Such a small percentage certainly gives little warrant for the present common use of the term prostatovesiculitis. (See section on Seminal Vesiculitis later in this chapter.)

**Symptoms**—In gently treated well behaved patients gonorrheal prostatitis rarely goes on to abscess formation. Such an eventuality usually bespeaks either ill advised intra urethral instrumentation or traumatic digital

manipulation of the prostate per rectum. Even these unwise procedures more often precipitate marked inflammatory swelling of the gland than they do true abscess formation. It is to be remembered that gonorrhea is mainly a mucosal and submucosal disease. True, the submucosal penetration of gonococci, when viewed microscopically, appears to be quite deep, but rarely in the absence of trauma is it so deep that it would cause much true interstitial infiltration of the gland. For this reason, gonorrheal prostatitis is usually a silent lesion accompanied by symptoms solely the result of the associated urethrotrigonitis.

Being confined mostly to the mucous membrane of the gland follicles, which themselves are structurally so poorly devised for good drainage, it is but natural that the condition, in the absence of efforts to promote drainage, should be long continued. For, as in almost all purulent infections, drainage in this disease is a *sine qua non* of cure. The prostatic infection acts in the rôle of bacterial feedet as well as a source of supply of gonococcal toxins to which the urethra remains sensitive for long periods of time. As such, it retards the immunity responses of the urethral mucous membrane and, because of its poor spontaneous drainage, it often has great difficulty in establishing these processes in its own follicles.

*Treatment.*—With good patient conduct, in the sense of avoiding both alcohol and sexual excitement, it almost always is possible, after varying periods, to promote drainage by digital stroking of the gland per rectum—drainage that brings about the establishment of good local immunity which gradually leads to the entire eradication of the gonococcus. There is left, however, a secondary infection by other bacteria which is evidenced by the continued presence of pus in the prostatic secretion. If the promotion of drainage by digital means is now discontinued the postgonorrheal infection will continue for many months, at least in all but an occasional patient. However, it is probable that, in those patients who have not been subjected to traumatic treatments which cause marked interstitial change with the formation of minute submucosal abscesses that open into the follicles or the urethra, the postgonorrheal gland infection spontaneously will clear up by the end of five or six years in many, if not most, cases. This is in marked contrast to the focal infective prostatitis secondary to more distant infections, for these rarely, if ever, undergo spontaneous cure.

Gonorrheal prostatitis during its early stages, however, does not lend itself well to digital manipulation. In fact, the time at which such treatments are safe varies so greatly in different patients that much judgment is required regarding its institution. If these treatments are done too early, or too strenuously, not only is the disease made worse but the curative responses are greatly retarded. Rarely is it a safe procedure within four weeks of the onset of prostatic infection. When started, it should be done by the gentlest type of stroking of the gland, and it should be discontinued if it causes a recrudescence of urethral or vesical symptoms lasting longer than twenty-four hours. It probably never should be done more often than twice a week, and it *seldom* is *productive of cure* if carried out less often.

A safe determination of the time when the gonorrheal infection has been succeeded by that kept up solely by the secondarily invading bacteria is not a simple matter. For this reason, and in view of the fact that the

secondary infection may cause the patient much local and perhaps, systemic damage it is hardly fair to the patient for the physician to draw too fixed a dead line between the one and the other. Yielding to this temptation has caused the unfortunate infection of many women. Unquestionably the standard of cure should be nothing short of a normal prostatic secretion on several studies.

The setting of standards often is far simpler than reaching them and it should not be inferred that it is always a simple matter to render such prostates entirely free of pus. In fact, there is in existence considerable skepticism regarding such an outcome in most cases. Entering into the causation of this attitude are a number of things. Outstanding among them are, for example, rough prostatic massage, too short a course of treatments, too widely spaced or irregularly given treatments, patient conduct favoring long and frequent periods of prostatic congestion, the presence of lymphocystic bodies in the posterior urethra. But, above all of them loom the influences of distant foci of infection, most commonly in the teeth or tonsils. Particularly does this apply to patients beyond the age of thirty years.

No longer can we blind ourselves to the fact that the teeth, tonsils and prostate gland are closely linked as a focal infective triad in adult life. This association has been fully considered under the heading of Focal Infective Prostatitis (page 374). Its connection here is by virtue of the fact that many of those who acquire gonorrhea have a prostatic infection antedating it. Curing such a gland of the infection upon which has been engrafted a gonococcal infection is not a simple matter. In fact, it cannot be cured permanently so long as the causal tonsillar or dental infection persists. It may improve, but it rarely can be rendered pus free and, if it is, it rarely will remain so for as long as six months. The importance of all of this in a consideration of gonorrheal and postgonorrheal prostatitis is that, just as soon as the infection assumes a stationary condition, oral infection should be searched for and removed.

The avoidance of those plans of treatment that harm the gland more than they help it, persistence in its treatment and a proper attention to possible distant infections will do much to banish one's skepticism regarding the possibility of curing such infections. Comparatively few cases are impossible of being rendered pus free, and most of those that do not make a proper degree of progress have a prostate gland that has been so badly damaged by disease or treatment that it is practically incurable. A view of the posterior urethra will reveal large canals with scarred openings. These canals pass deep into the gland structure and are so thick walled that they cannot collapse. Their drainage is a matter of overflow and their mucous membrane is of a highly unhealthy type.

While the matter of drainage has received the greatest stress, there is of course behind the entire matter the question of immunity establishment. Unfortunately, the bacteria at fault, usually the gram positive cocci, are ones to which immunity is not developed readily by a great number of individuals. Susceptibility to infection by them is, in the final analysis, a change in body chemistry, and in its correction the question of general health is a matter of some importance. In the establishment of immunity, there are other matters of much importance that, perhaps, apply to these



cases as they do in true focal infective prostatitis, under which heading they are more fully discussed.

Aside from these matters, the question of time is well worthy of discussion. It is rare that an infected prostate is cured in less than three months of treatment consisting of two prostatic massages a week. If no associated focal infections have been found, it is wise to give patients who are not well in four months a rest of from six to eight weeks and then to proceed with another course of treatments.

During the time the gonococcus is present it is well to carry out some form of nonirritating chemical stimulation to the urethral surface, as has been advised under the treatment of gonorrhea. As soon as there is reason to believe the gonococcus no longer is present, it is best to discontinue these chemicals. Otherwise, the urethra is prone to rebel and either develop a mucoid or purulent discharge, or cause the continued presence of shreds in the urine, to the annoyance of both the patient and his physician. At such a time it is perfectly safe to give the prostatic massage with the bladder containing some urine which should be voided immediately after the treatment.

Just how much of a change the administration of a sulfonamide will make in this clinical picture is for the future to prove. That it does, at times, the most miraculous of things in some patients is beyond question, as far as gonorrheal prostatitis is concerned. That it fails most signally in others is outstanding. And, where it does fail, one has much need for a clear understanding of the other and more tried curative procedures. We know even less about its action in postgonorrheal prostatitis, where it, probably, will have only a fraction of the value it has in the gonorrheal phase.

The question of heat applied by one means or another to this structure has been fully discussed under the heading of Rectal Heat. That it is an aid in some cases cannot be questioned but that, of itself, it produces cure is highly doubtful.

Grant has suggested the direct injection of bactericides into the prostate for the "cure" of resistant cases. This seems to the writer to be a thoroughly unscientific procedure and that it may cause more future trouble than it is supposed to relieve is highly indicated by the studies of O'Connor<sup>1</sup> upon dogs. He expresses his opinion as follows: "It would appear from these studies that anything injected into the prostate, whether it be normal saline, distilled water or of a so-called antiseptic character, results in marked destruction of acini, chronic inflammatory changes and marked fibrosis. We suggest that the clinical benefit from this procedure might more properly be attributed to fibrotic replacement of infected glandular areas than to an immediate antiseptic effect at the time of injection."

**Focal Infective Prostatitis.**—While our knowledge of postgonorrheal prostatitis has directed our attention to infections of this gland for many years, it is only of late years that we have begun to sense the intimate association of prostatitis with that widely varying group of conditions that have been attributed to the influences of limited foci of infection. And, as we have progressed in our knowledge of such things, we have had to lay aside many of our older beliefs. Particularly have we been forced to infer

<sup>1</sup> Jour. Urol., 39: 160, 1938.

the widespread and tenacious conviction that an infected prostate gland proved that the patient had had gonorrhea despite his most earnest denials. For we did hold this belief and, unfortunately, and most unfairly, it is still held by a considerable proportion of physicians.

So narrow and so unfair an etiologic concept regarding a disease condition that is found in at least 35 per cent of all men beyond the age of thirty five years has done much to retard science. It has been so utterly lacking, in fact, that it has stood solely upon a foundation of puritanism and ignorance of the factors at play. It branded most men as prevaricators and entangled prostatitis with the diseases considered by some few to be almost beyond the pale of right thinking.

As we throw aside a concept so unscientific, we find in our accumulating observations and experiences a field the breadth and importance of which has been little suspected by even the urologists themselves. Gradually, the question is being placed where little need be left to guesswork. And it is found that it has ramifications into all the fields of medicine. We learn therein the reason for many of our failures to cure in the past. We uncover a realm wherein the immunologist will find much of interest and of inestimable value to the afflicted.

From an etiologic standpoint we are confronted by such things as tissue biochemistry, in that its soil changes favor bacterial growth, the unquestionable fact of bacterial transmission from areas so remote as the oral cavity, the question of anatomic structure and physiologic function, so far as they have to do with drainage possibilities, and the lack of association of gonorrhea.

On the immunologic side we encounter not only the question of soil but an interchange of other factors that have to do with the recovery from disease. We see in the background, perhaps, perverted physiology and a delicate balance between immunity efforts on the one hand and a protein sensitization of various structures on the other. We see in our treatment efforts a steady progress toward cure in many cases. We easily discern that our usual plan of treatment (prostatic massage), which we have grown to think of from the standpoint of artificial drainage, is a far more complicated problem. Not only is it drainage, but it is far more. It is virtually an autovaccination and it has all of those features at play that hold in the injection of vaccines themselves. It may stimulate immunity or, in the highly sensitized individual, it may obliterate it. It may increase sensitization to an appalling degree, or it may remove it. And it probably has other features that we do not even suspect.

*Etiology*—Perhaps the outstanding feature of this lesion is that it rarely has any relation whatever to gonorrhea. In a large series of cases studied, gonorrhea appeared in the histories of but a small percentage and, in only a few, had this disease been present within ten years of the onset of symptoms urging the prostatic study. Gonorrhea is predominantly a disease of early life with its average incidence at twenty-five years of age. Whereas, focal infective prostatitis belongs even more predominantly to later life, with its average age incidence at forty-nine years, and it becomes increasingly common until it reaches its peak in the sixth decade.

It would seem from an analysis of the conditions of the patients presenting the lesion that certain biochemical tissue changes incident to ad-

vancing years had to do with the soil changes favoring infection, as well as a sensitization to the toxins thereof. For a large majority of those patients showing systemic manifestations attributable to such foci of infection give the impression of precocious tissue-ageing.

Unquestionably, the prostatitis in almost all cases is secondary to some more distant infective focus and not due to the transplantation of bacteria from the urethra itself. The most usual primary foci, as has been said, are in tonsils, teeth or both. In the above mentioned series of cases 69 per cent had infected tonsils, 61 per cent had infected teeth, 44 per cent had both and 15 per cent had neither. Upon rare occasions the bowel or gallbladder may serve as primary points of bacterial distribution. Acute infectious diseases such as typhoid, pneumonia, influenza, and the like, may account for a few infections of the prostate, the paranasal sinuses hardly

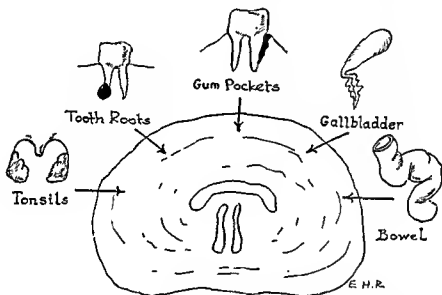


Fig. 196.—Diagram to illustrate the common foci of infection to which focal prostatitis is secondary.

ever. It is outstanding, therefore, that the male focal infective triad is tonsils, teeth, and prostate gland. An idea of the frequency of this lesion also is to be had from the fact that 72 per cent of male patients studied because of focal infective symptoms showed definite infection of the prostate gland.

So closely is the infection in the prostate gland associated with more distant foci of infection, that it is possible to lay down a number of rather fixed rules in this regard that aid us greatly in both our understanding of the process and our treatment of it.

1. The prostatic infection cannot be cleared up permanently so long as the causal foci remain.

2. If no improvement is seen in the prostatic secretion after six weeks of routine prostatic massage it is probable that there are still some distant foci.

3 If the prostatic infection clears up but recurs, there are other dental infections—providing the tonsils are out

4 If there are no further dental infections, and the prostatic infection recurs, the diagnosis of 'normal tonsils,' in all probability is wrong

5 If the distant foci in teeth or tonsils supposedly have been removed and the patient is not markedly improved after six weeks of prostatic treatment, one had better investigate the gallbladder or question the last x ray of the teeth and have it repeated

6 If these are all negative and there is no change in distant symptoms, he can be assured that the prostate had little if anything to do with those symptoms, and he would do well to center attention on the gastro intestinal tract

Beyond the age of forty years focal infective prostatitis is predominantly a silent lesion, insofar as local symptoms are concerned. Before this age, when it rarely gives systemic suggestions of its presence, it most often is encountered in the search for the cause of nonspecific urethral discharge. Upon very rare occasions, and at any age, its presenting symptom evidently is due to the rupture of some mucosal pus pocket at or near the vesical outlet. It then causes urethrotigonitis of varying grades associated with marked frequency of urination, pyuria, occasionally hematuria, and, at times, a purulent discharge from the urethra. There is no pain in the gland either before or after this occurrence, and all the subjective symptoms are vesical and urethral.

The prostate having become secondarily infected, there is little to suggest that it ever undergoes spontaneous cure, even if its causal foci in tonsils and teeth are eradicated. The common occurrence of further tooth root infections seemingly suggests a reverse association and brings up the question of the prostatic infection possibly serving as a source of such later tooth infections. Such a suspicion, however, is not readily susceptible of proof, but its theoretic possibility gives an added reason for clearing up the gland infection.

*Symptoms*—A recital of the countless symptoms and diseases that have their origin wholly or in part in phenomena associated with toxic absorption from some area of infection would serve to accentuate their possible potentialities. Not only do they cause sensory disturbances, changes in the heart musculature, serious diseases of the eyes, joints, muscles, kidneys and, at times, the mucous membranes but they take part in countless other perversions of physiology. It, thus, will be seen that focal infective prostatitis assumes an importance far out of proportion to the seeming innocence of the local lesion. It stands second, if not equal, to that of oral infections and, frequently, it is the reason why attention to these is not so productive of expected results. The lesion should be in the mind of every one who assays to care for any of those varied manifestations of focal infection. Few facts stand upon a firmer clinical foundation. That this knowledge needs wider circulation is shown by the fact that, even today, an average of 45 years elapse between the onset of focal infective symptoms and the first real prostatic study. Such oversight adds enormously to the sum total of human morbidity and is one of the many reasons why arthritis and kindred ailments remain one of mankind's greatest economic health burdens.

*Diagnosis and Treatment*—Under the headings of The Study of Pros-

tatic Secretions and Prostatic Massage, the diagnosis and routine treatment of prostatic infections have been described. To this description should be added a number of things regarding the behavior of the infection and the reactions of the patient during the course of treatment of focal infective prostatitis, that find little application to the routine treatment of post-gonorrheal prostatitis.

The phenomenon of the increase of distant focal infective symptoms following digital manipulation of the prostate gland in at least 50 per cent of the cases was described by the writer in 1921. Since that time there has been a far greater opportunity to study these reactions and to evaluate their possible dangers to the patient. In the first place, it is obvious that they do not differ greatly from the reactions we have seen following the injection of specific vaccines. Their specificity for the distant symptom-giving lesion is almost absolute. While they may produce upon rare occasions chills and elevation of temperature, they always increase the severity of the patient's symptoms whenever they give any reaction whatever.

As a rule, the reaction following prostatic manipulation comes on within twelve hours and has subsided within twenty-four hours. At times, however, it does not subside for weeks, and assumes serious importance. These profound, continued, and dangerous reactions almost wholly are confined to patients who present either active arthritis, myocarditis, or one of the several focal infective eye diseases. Particularly is this true of ocular lesions, wherein the threshold of toxin tolerance is a very narrow one, so narrow, in fact, that the added inflammatory reaction may do irreparable harm. The reactions of myocarditis are not without great danger. The reactions experienced by persons with highly active arthritis, particularly of the hypertrophic type, often are extremely painful and last for a week or more. If treatment is repeated to the extent that such reactions are pyramided, great harm is done.

In this connection it is of value to cite several such things that have come under the writer's observation or have occurred in his practice.

Case 1: This patient was referred because of an iritis that was considered to be of focal infective origin. A prostatic stroking, too lightly done to obtain prostatic secretion for study, gave a marked eye reaction. After this, the prostatic stroking was done so lightly that it caused no eye reaction, or but the slightest. The effort was to keep under the reaction point.

After a few months the patient returned to his home town, where he was treated carefully by a skilled urologist conversant with the previous history. One day the urologist was not in his office and his assistant, knowing nothing about the case, gave a routine prostatic massage. The eye reaction was so severe on the following day that the patient was placed in a dark room, where he spent the next three months. He emerged with only a fraction of the vision he had before the unfortunately strenuous prostatic massage.

Case 2: The writer was asked to see a prominent physician who was confined to the hospital because of a continued fever. The purpose of the visit was to find out if a known focal infective prostatitis was a factor in the causation of the temperature elevation. Having cared for the patient before, the writer knew that he had a myocarditis and was particularly prone to develop marked reactions after prostatic massage. Because of this,

only the slightest pressure was made over both lateral prostatic lobes, with the conviction that there would be a slight increase in temperature if the prostatic infection was a factor. Despite the caution exercised, the temperature went up three degrees and remained so for two weeks, during which time the patient was so desperately ill as to be denied visitors. In fact, for some days his outlook was decidedly gloomy.

Case 3. This patient had been seen during an attack of active arthritis several years before, which gradually had cleared up, though the prostate never had become pus free. His arthritis had recurred and, in the absence of other demonstrable foci of infection, it was assumed that the prostate was at fault. A massage for study purposes caused the most profound reaction in his affected joints, nor was it possible to make even the slightest pressure to the gland without producing a like reaction. After several trials the idea of the promotion of prostatic drainage by massage was abandoned temporarily. The patient spent the summer at the seashore, lying in the sun as much as he could. He made a marked physical improvement and some joint improvement. Prostatic massage was tried later and gave no joint reaction, regardless of the pressure used. The joints gradually became normal, as did also the prostate, which previously had failed to become pus-free after two courses of massage. It has remained normal for six years.

It thus is obvious that the treatment of focal infective prostatitis must be viewed from many angles. In no sense should it be the routine affair so often permissible in postgonorrheal prostatitis. There must be kept in the foreground the questions of toxin tolerance and toxin dosage, sensitization and desensitization and the possibility of obliterating immunity responses by the forcing into the system by prostatic massage of overwhelming amounts of the toxin to which it is so highly sensitive. So great are the dangers in the three conditions just mentioned that it often is a hazardous procedure to apply in their presence sufficient prostatic pressure to cause the appearance of prostatic secretion at the urethral meatus. In the presence of active arthritis and eye lesions, such as ulcerative keratitis, iritis and iridocyclitis, there invariably is a slight reaction following the first digital pressure on the prostate, however gentle it may be, if the gland is a factor in the distant lesion. Thus, in these cases, one may feel sure that the gland is not a causal factor if such a reaction fails to occur. For this reason, it is safest in such patients to limit the diagnostic pressure to the lightest stroking and leave the study of the prostatic secretion to a later, safer time.

Upon the rarest of occasions, these distant reactions are delayed in their appearance, occurring even as late as forty-eight hours after the diagnostic prostatic massage.

As the result of a number of years of study of these reactions and their influences upon the course of the disease demanding treatment, it has been possible to lay down a number of near rules regarding them, the most important of which are as follows:

1. Their occurrence is proof that the prostate is a factor in the focal infective symptoms.

2. Their failure to take place has no negative significance, except in ocular lesions and active arthritis.

3. They take place in at least 50 per cent of all cases in which prostatic infection is a factor, 100 per cent of the eye cases, about the same percentage of active arthritis cases and a smaller percentage of those with myocarditis.

4. They correspond in every way with protein or vaccine reactions, with a marked specificity for the distant symptom-giving lesion.

5. Being of the nature of a vaccine reaction, they urge the necessity of viewing all prostatic manipulations from the standpoint of toxin dosage and toxin tolerance, and of varying the pressure of them accordingly.

6. The procedure causing these reactions should not be repeated within three days of their entire disappearance.

7. Too profound a reaction reduces the patient's curative responses and may put them in abeyance for long periods of time.

8. They are of the greatest possible danger in the presence of active ocular lesions and may produce irreparable harm.

9. They cause great pain and swelling in the presence of marked joint involvement and, if profound, delay cure for many weeks.

10. They rarely, except in eye cases, take place after the first few prostatic treatments.

11. If they continue to occur after even gentle massage in any type of case, the massage should be discontinued and every effort made to improve the patient's health before they are started again.

12. The more acute the distant symptoms for which prostatic massage is indicated the more gently should the massage be done.

13. Prostatic massage should not be carried out within a week after a tonsillectomy or tooth extraction that has caused even the slightest systemic reaction.

14. Providing the prostatic infection is the only causal infection remaining, all distant painful symptoms should be relieved or banished by the end of six weeks that have included two treatments a week.

15. Failure of these painful symptoms to disappear usually means that the prostate has nothing to do with the symptoms or that a distant infection has been overlooked. It urges the necessity of an entire restudy of the patient.

16. If the prostatic secretion has been rendered pus-free, as shown by studies on three consecutive weeks, it should be restudied at the end of three months.

17. If pus is found present at this time one safely can predict the finding of further dental infections.

18. The use of autogenous vaccines during the course of prostatic massage has only served to make the prostatic infection more tenacious. This probably is due to a virtual doubling up of vaccinations, the artificial one and the autovaccination resulting from prostatic massage.

19. The value of rest periods after long periods of treatment should not be overlooked, and the wisdom of a continued search for other foci of infection is easily sensed.

20. It never should be forgotten that such patients are rarely solely urologic problems. Pemberton, above all others, has shown that in the background is a perverted physiology requiring the most careful medical study and treatment.

**Prostatic Abscess—Small Abscesses**—The formation of one or more small abscesses in the prostate gland is not so rare as generally is supposed. Indeed, many of the badly infected prostates in which cysto urethroscopic study reveals large openings passing from the posterior urethra into the gland substance, are undoubtedly the visible remains of old, small abscesses that have ruptured spontaneously into that canal. These may have been of gonorrheal origin but it is a clinical fact that they are not confined alone to those who have had that disease.

Unquestionably, blood borne infections from far distant foci, such as teeth and tonsils may cause such abscesses. Some patients have a symptom complex that could mean almost nothing else than the rupture of a small silent abscess at or near the vesical outlet. Some of these account for those transient periods of supposed cystitis that clear up within a week.

**SYMPTOMS**—The more dramatic seizures of this type come on suddenly with vesical discomfort a sudden pyuria and perhaps a few drops of



Fig 197—A, Most common directions of rupture of abscess cavities lying close to the urethra. B Directions of rupture of abscesses near the prostatic capsule.

blood after the first one or two urinations. For a few days there is a urinary frequency which gradually subsides and the haziness of the voided urine clears up. At times there is a purulent discharge from the urethra which may begin the first or second day. Other cases wherein the abscess ruptures into the posterior urethra at such a point that it has no influence on the trigone do not experience the vesical discomfort, nor do they have so marked a pyuria.

The writer recalls several patients whose first attack started with a definite feeling of something breaking in the region of the vesical outlet. Within a few hours thereafter they had marked frequency of urination and a cloudy urine slightly stained by blood. The next day there was a profuse greenish urethral discharge showing pus, no gonococci and only an occasional gram positive coccus. These attacks lasted about a week, then cleared up entirely.

On several later occasions in the next four years one had acute attacks of



pyuria and urethral discharge with no vesical discomfort. On three occasions his prostatic secretion had been rendered normal by treatment, only to become purulent again. After the last attack a dental x-ray (which had not been taken before because the association between dental infections and the prostate was not then known) showed a number of dental abscesses. Following the removal of these teeth the prostatic secretion again was rendered normal by massage and remained so without further recurrence for the following five years, when the patient was lost to sight.

None of these cases that the writer has seen has had any of the supposed classic symptoms of prostatic infection so commonly given in some of our textbooks, such as, pain in the back, groin, perineum or other locations. Nor has there been the slightest suggestion that any of them had that very much overrated lesion, seminal vesiculitis.

On rectal examination, in these patients, there was no swelling or unusual sensitiveness of the prostate gland, though after the acuteness of the attack had worn off it was possible to express from the gland a large quantity of pus. This often was so thick as to leave no doubt about its having been pressed from a cavity in the gland. Frequently it was blood-stained.

It is probable that a similar process occurs in the prostate gland in many of those patients whose acute gonorrheal posterior urethritis runs such a severe and erratic course, with moderately quiescent periods followed, without apparent cause, by acute recrudescences of both pus and discomfort.

Aside from these minor cases of submucosal abscess of the prostate, there also occur at times deep-seated abscesses that bear resemblance to those occasionally seen in the traumatized gonorrheal prostate. They have their rectal discomfort, their fever and, perhaps, interference with free urination that are so common to the gonorrheal variety and their treatment does not differ in any way.

**TREATMENT.**—The treatment of the nongonorrheal submucosal abscess in those cases associated with vesical discomfort should be hot hip-baths and oral sedatives. When the urinary frequency has subsided, potassium permanganate irrigations (1:8000) followed later by gentle prostatic massage are indicated. In those patients having no vesical discomfort, irrigation may be started at once, but it is better in both to wait a week or two before starting prostatic massage. During this time a careful search should be made for the causative focus or foci and steps taken for their correction. In some cases the administration of sulfonamide is highly beneficial, in others it is highly disappointing, as would be expected from their common staphylococcal origin.

**Large Abscesses.**—While this subject has been considered under the complications of gonorrhea and under acute prostatitis there are some angles of it that do not blend in with either of these subjects and require separate attention. Most cases of prostatic abscess of this type are the result of acute gonorrheal prostatitis, though most cases of acute prostatitis do not go on to demonstrable abscess formation. As elsewhere has been stated, acute swellings of the prostate as the result of gonococcal infection are, in most cases, due to traumatic treatment of the structures long before they are able to stand such insults.

Massive prostatic abscess, at times, takes place in individuals who have not gonorrhea, and not a few such cases have been mistaken for typhoid fever during the first week. For this reason, one should not confine his ideas of the lesion to gonorrhea alone. The writer saw a physician friend almost lose his life when a urologist would not believe in prostatic abscess just because the patient had no gonorrhea. The abscess broke through the prostatic capsule and infiltrated widely in the prostatic region before surgical drainage was resorted to.

**SYMPTOMS**—The precise symptoms attending prostatic abscess depend largely upon the location and size of the suppurating area. If it is in the median commissure, where it rarely is, or in the lateral lobes, where it usually is, at such a position that it inflames the bladder base, the predominating symptoms will naturally be marked frequency and urgency of urination with extremely painful tenesmus. If the abscess causes partial obstruction at the vesical outlet, there, of course, will be great difficulty in urination or, even, retention. If the abscess formation is near the external capsule the urinary symptoms are not usually so marked.

Frequently, the patient experiences a dull, throbbing pain in the region of the gland which may be radiated into the back, thighs, testicles or occasionally along the urethra. If there is decided bulging of the gland toward the rectum there is a feeling of rectal fullness, pain on defecation and, rarely, ribbon-shaped stools.

In practically all cases there is a marked rise in the leukocyte count. Here, however, one may come to a faulty diagnosis, for the individual with acute prostatitis which does not go on to abscess formation also has a high leukocyte count, and it remains high even after the gland swelling virtually has subsided.

In the early days of most prostatic abscesses there is some elevation of temperature, which occasionally may reach  $104^{\circ}$  or  $105^{\circ}$  F. This is equally true of acute prostatitis in many patients. In these later, the temperature is prone to subside in four or five days. In resolving prostatitis it stays down and in true abscess formation it rises, but seldom so high as it formerly was. In acute prostatitis the size of the gland reduces as the result of rectal heat but, if abscess formation occurs, it fails to reduce in the region of the forming abscess. This is felt as a hard area which begins to increase slowly in size and may become slightly softer as it increases.

True prostatic abscess does not undergo reduction in size as the result of rectal heat. It gradually increases, as, usually, do the symptoms of it. The prostration is greater, the temperature is prone to be of the septic type and one seldom has any doubt about his patient's being worse.

**DIAGNOSIS**—The symptoms mentioned frequently are enough for a probable diagnosis. It, however, must not be assumed that this is a simple matter in all cases. Those that are *most likely* to mislead are the cases of acutely swollen gland of which at least 95 per cent will go on to resolution under the treatment advised under acute gonorrheal prostatitis. As a rule, it is only in neglected cases of prostatic abscess that one is forced to view the condition as demanding immediate surgical intervention. Thus, there usually is a safe interval during which a patient may be watched in order to differentiate between the far more common acute prostatitis and true abscess formation. One who waits for the appearance of fluctuation in such

a gland makes an error, for fluctuation rarely appears before a prostatic abscess has broken through the gland capsule and involved the periprostatic tissues. It is far better to make a few mistakes by having perineal drainage done on a lagging case of acute prostatitis than to allow patients to wait until fluctuation is evident. It is here that mortality increases. As has been said, one should be particularly suspicious of abscess formation in the patient with an acutely swollen prostate if the temperature subsides and recurs, or if one side of the gland reduces in size and the other remains enlarged.

**TREATMENT.**—The treatment of prostatic abscess is in no sense an office procedure and he who tries to make it so will have much to regret. Modern urology frowns on makeshift methods of drainage and insists upon a deliberate operation through the perineum, with the far better drainage that such an operation makes possible. Before resorting to surgery, however, it is well to try sulfanilamide or an allied drug for a few days. Usually it exercises no curative effect but, upon rare occasions, it may be most dramatically effective.

**Prostatic Tuberculosis.**—It is probable that tuberculous infection of the prostate gland is far more common than generally is supposed. There is reason to believe that many such infections are never discovered, as the involvement is of a minor grade and goes on to spontaneous recovery without occasioning sufficient symptoms to call attention to its presence. Not only is the prostate gland involved in at least 70 per cent of all cases of genital tuberculosis and 5 per cent of all patients dying of tuberculosis, but it is probable that the gland really becomes infected in a large proportion of those cases presenting a tuberculous renal infection. And, if McCarthy is correct in his belief that the large, scarred prostatic openings seen urethroscopically are due to a played-out tuberculosis, there can be no doubt that there is a good number of patients who pass through the malady without suspicion or diagnosis.

The age-old discussion as to just what particular portion of the genital tract is involved first is of little clinical importance. For it is outstanding that there is a multiple involvement in the majority of cases and it is but natural that the prostate gland being, as it were, at the urinary-seminal crossroads, should be infected in tuberculosis of both systems.

Genital tuberculosis being unquestionably due to blood-borne tubercle bacilli from some other distant focus, the question of the first genital focus is a matter of just what portion of the tract the bacilli reach that furnishes them a favorable abiding place. This may be the prostate, the seminal vesicles, the epididymides, alone or severally, and there is a wide diversity of opinions regarding the usual first. As epididymal tuberculosis lends itself to more ready diagnosis, it is but natural that those structures should be favored by many. The difference in the figures of incidence between epididymal and prostatic involvement is so slight that they easily can be accounted for by the greater ease of diagnosis of the former and the common symptomatic silence of the latter.

The concomitant involvement of the prostate and the seminal vesicles is of frequent occurrence, though it is not unusual to find definite evidences of involvement in one without its being possible to demonstrate it in the other. *Pathologically*, tuberculosis of the prostate does not differ

from tuberculosis in other structures and it is susceptible of the same classifications. The lesions vary from the isolated, minute tubercle to the larger caseating areas or even to definite abscesses of large size. In her efforts to control the process Nature throws out much fibrous tissue, and it is upon this fact that we largely are dependent for our clinical diagnosis. From this process there results an irregular nodulation of the gland which, though it may, and commonly does approach the stony hardness of carcinoma, is seldom difficult to differentiate from that condition. For carcinoma almost invariably lacks the irregular nodulation so characteristic of the advanced stages of tuberculosis. Early in tuberculosis the areas of induration frequently are small in diameter, have soft prostatic tissue between them, and the condition is more likely to be confused with other pyogenic infections.

While these caseating areas rarely break through the prostatic capsule posteriorly, they do, at times, point into the perineum or rectum with an eventuating fistulous tract. More often, they rupture into the urethra. And, far more often, they are so encapsulated by fibrous tissue that they do not rupture at all.

**Symptoms**—Tuberculous infection of the prostate gland may produce no symptoms. Indeed, this symptomatic silence is one of the outstanding features of the lesion in many cases. If, however, posterior urethral ulceration takes place, or the gland, as occasionally is the case, assumes such a size as to exercise an obstructive influence at the bladder outlet, the symptoms may be of a pronounced character. If the lesion involves the base of the bladder there are the most atrocious of vesical symptoms. Frequency, tenesmus, pyuria and, at times, hematuria are the same as take place in bladder involvement secondary to upper tract tuberculosis.

Aside from these evidences of either mucosal involvement or of obstruction, which sometimes occur, it is probable that most cases wherein the prostate alone is involved escape detection. This surely is so, if the previously cited observation of McCarthy is correct.

**Diagnosis**—In the absence of other urogenital involvement the diagnosis of prostatic tuberculosis in its earlier stages is often impossible to make. The demonstration of tubercle bacilli in the gland secretion is rarely made and, where one suspects tuberculosis, it assuredly is not a wise thing to massage the gland in order to obtain its secretion. Under such circumstances, it is far wiser to let time settle the diagnosis. For the dangers of the production of a milary tuberculosis or the precipitation of massive lesions from the trauma of massage are in no sense imaginary ones. Landis for years urged the dangers of such a procedure in known tuberculous patients and the author has several case histories of patients grossly harmed by it. This phase of the subject is further discussed under the heading of Prostatic Massage. At times, the amount of fibrosis at the vesical outlet is such that an instrument passed into the posterior urethra conveys to the finger holding it not only a definite sense of tissue hardness, but a sensation as though the instrument were grasped by a hand. The same finding is rather a common one in scirrhous carcinomatous growths of the gland.

**Treatment**—Unquestionably, the treatment of prostatic tuberculosis should be a conservative one wherein surgery is resorted to only for complications urgently demanding it. Surely the operation of total prostatectomy

is rarely, if ever, indicated. In this operation, a truly major procedure, the entire tuberculous involvement rarely is removed and the patient seldom does well after it. Of it, Keyes says, "This operation should be absolutely condemned until its supporters shall prove it at least innocuous by more convincing evidence than is as yet at hand."

In the presence of vesical outlet obstruction from fibrosis in such a gland the newer methods of transurethral electric excision may have much to offer. Before resorting to them in the absence of tuberculous bladder involvement one must consider seriously the possibility of such a postoperative extension and the probability of slow healing.

While it is true that some patients show massive destruction as the result of prostatic and vesicular involvement, it is equally true that most do not. And the viewing of these lesions as medical ones, rather than surgical, pays the better dividends in patient comfort and life. As much as can be done for the building up of resistance and as little as must be done locally is by far the best rule to follow. Some advise the careful use of tuberculin kept well under the reaction point. All advise a strict antituberculous regime.

**Prostatic Calculus.**—The presence of small calculi in the prostate gland is not an uncommon thing. They vary from one or two to a large number. The diagnosis is rarely made until, for some other reason, an x-ray of the bony pelvis is made. Then they are plainly seen just behind the pubic bone much further forward than is the case with vesical calculi. Their presence, at times, is suggested by a slight crepitating sensation conveyed to the finger while doing prostatic massage.

Large prostatic calculi usually form in cavities left after the evacuation of prostatic abscesses. Such cavities are, in a sense, urethral diverticuli and the calculi that fill them are at times rather large ones. They may project into the urethral lumen and create an assortment of sensory disturbances that lead to their discovery. Under such circumstances, they become surgical problems far too severe for office attention.

Usually the smaller prostatic calculi may be disregarded, though one rarely clears up by massage the infections that usually accompany them. Upon extremely rare occasions they are accompanied by sharp pains, either constant or intermittent, along the urethra. This pain often can be stopped by a light fulguration running transversely across the postmontane fossa. If this is not productive of relief, surgery is worthy of consideration, though one should not promise too much in the way of relief of pain as it, at times, fails to give such relief and the pains continue.

**Prostatic Obstruction.**—A consideration of the varied aspects of vesical outlet obstructions resulting from changes in the prostate gland is in no sense a small matter. For the urologist, few subjects are of greater importance and, for those in general practice, few things are less fully understood. In fact, this lack of familiarity with the factors at play and their results has caused many cases of prostatic obstruction to be overlooked for long periods of time. Nowhere is this more forcibly brought out than in Randall's work,<sup>1</sup> wherein a depressing number of the victims of this malady reached the autopsy table without even a suspicion having been cast upon the prostate gland as a factor in the patient's illness. And this, despite the fact that many

<sup>1</sup> Randall, Alexander: *Surgical Pathology of Prostatic Obstruction*; Williams and Wilkins Co., Baltimore, Md.

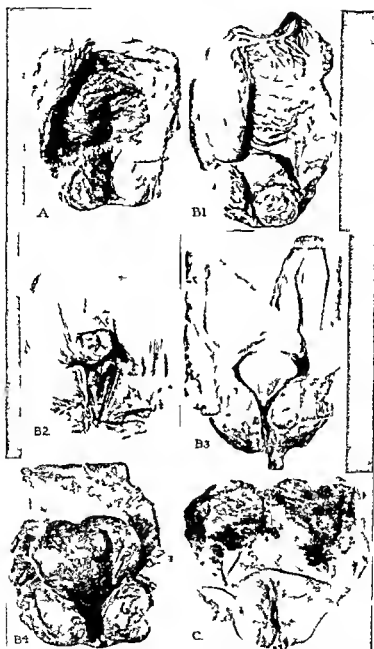


Fig 198 Several types of prostatic enlargement A Lateral lobe hypertrophy without herniation through the bladder sphincter B1 Lateral and median lobe hypertrophy B2 Suprapubic view of trilobar hypertrophy B3 Enlargement of the lateral and subcervical lobes B4 Lateral hypertrophy with enormous enlargement of the subcervical glands C The so-called horse-collar type of trilobar hypertrophy (From Randall's Surgical Pathology of Prostatic Obstruction Williams and Wilkins Co Baltimore)

of them presented symptoms of so outstanding a nature that they would have riveted the attention of even a tyro in urology Singularly enough

most of these cases were under the care of clinicians of wide reputation for their knowledge of things medical.

That they could occur with such frequency would indicate that the message of the urologist regarding the discovery of these obstructions in their earlier stages has not gotten very far, and would urge the necessity for greater efforts toward a more general understanding of the symptoms indicating such conditions, as well as the means of arriving at a diagnosis of them.

Perhaps the most important thing in this regard is the eradication of the widespread belief that prostatic obstructions belong only to those well past middle life. When Randall shows at autopsy definite prostatic hypertrophy in 2.6 per cent of 112 patients between the ages of twenty and twenty-nine years and an incidence of 9.7 per cent of 235 patients between forty and forty-nine years of age, there is little reason to consider obstructions due to hypertrophy as the misfortunes of the aged alone. When we turn to obstructions due to so-called fibrotic bar, which often is equally destructive to health and life, we find the entire picture reversed. Here we find our greatest incidence between the ages of twenty and twenty-nine years, with a gradual reduction in numbers as age advances. Surely, with such a portrayal of facts we are on very poor ground when we think of age at all. Certainly, we have no reason whatever to dismiss the possibility of urinary obstruction due to the prostate gland no matter what the age of the patient may be. When we think less of age and more of other things we shall be guilty of fewer of these diagnostic misfortunes.

Unquestionably, we should pay a greater respect to the minor symptoms of urinary dysfunction than commonly holds. They usually are the first signals of prostatic obstruction and we should not too readily explain them away on other grounds. It is true that urinary frequency and difficulty in starting the urinary stream rather commonly are due to the nervous make-up of the patient. But it is equally true that they more often are the first symptoms of vesical outlet obstruction, and, being so, it frequently is hazardous to dismiss them without further study. Not that one must resort to surgical procedures at once in these patients, but that their lesions should be made matters of record and carefully watched.

There, also, is needed a greater familiarity with the normal variations of prostatic size, contour and consistency. It not infrequently happens that patients with no prostatic hypertrophy are made miserable by having such a diagnosis made. Under the heading of Rectal Palpation these differences have been discussed at length.

It, further, should be understood that the prostate gland may enlarge at its vesical outlet and urethral aspects without any evidence of enlargement to the finger in the rectum. In fact, such is usually the case with median lobe enlargements in the absence of lateral lobe involvement. It always is the case with hypertrophy of the subcervical glands. In Randall's cases of hypertrophy the former accounted for 27.4 per cent and the latter for 13.5 per cent. In his 279 cases of vesical outlet obstruction, exclusive of abscess and carcinoma, there were 57 cases of median bar which, also, would give no suggestive signs on rectal examination. In other words about 53.1 per cent of the cases probably would have escaped detection by rectal palpation alone.

Our common use of the word prostatectomy has done much to develop

a belief that the whole prostate shares in the process of hypertrophy and that, when the surgeon does what he calls a prostatectomy, he really removes the prostate. Nothing could be further from the truth. The so-called hypertrophy is a new growth that forms in certain portions of the gland structure. As it develops it becomes encapsulated so as to form a distinct line of cleavage between itself and the unaffected prostatic tissue which it has compressed. When a "prostatectomy" is done the operator finds this line of cleavage shells out the new growth, and relieves the intraprostatic pressure. The true prostatic tissue gradually fills the space from which the growth was removed. When things are all over we find, per rectum, that the prostate is there, and we have no difficulty in pressing out its secretion for microscopic study.

**Etiology**—The etiology of fibrous median bar formation is rather well understood. Starting as an infective prostatitis, there are poured into the interfollicular areas large numbers of round cells which gradually go through their inherent changes until fibrous tissue formation, with its subsequent contraction, takes place. While this change is most obvious cystoscopically at the vesical outlet, it usually involves most of the functioning

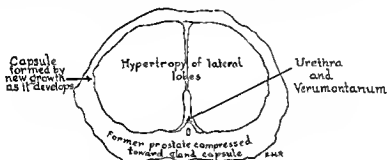


Fig. 199—Diagram to illustrate the method of compression of the true prostatic substance by hypertrophy occurring in the lateral lobes

part of the gland. Its location in the lateral lobes causes no obstruction to urination, though it probably does slightly narrow the canal. The median lobe fibrosis narrows the vesical outlet and pulls the posterior vesical lip upward. It exercises its obstructive effect by virtue of this and an increased rigidity of structures that were meant to be soft and pliable.

Prostatic hypertrophy has lent itself to no such simple explanation. Despite an almost endless amount of study we seemingly are as much at sea about its true cause as our forefathers were. Just why certain portions of a glandular structure should enlarge and, in their enlargement, surround themselves with a virtual capsule that separates them from the rest of the prostate, has baffled us all.

The interesting work of Lower and others in parabiotic rats looked at first as though it might lead to an explanation of the cause of prostatic hypertrophy. The increase in size of the prostate caused by his experiments involved the entire rat gland, however, and gave no such pathologic picture as holds in what we are pleased to call prostatic hypertrophy in humans.

A rather easily satisfied clinical group of late has tried to spread the belief that prostatic hypertrophy is an aftermath of prostatic infection.



They based their belief largely on the fact that the secretion from most such prostates contains pus. Some go so far as to state that hypertrophy can be avoided by prostatic massage. Others hint that such massage will delay or check further increase in size in the early stages of enlargement. One went so far as to write a brochure to put forth such a view. He insisted that massage would do all of these things if at the same time the patient indulged actively in sexual pursuits.

The writer is in the unfortunate position of being utterly unable to find any truth in such statements. In fact, he feels that they are good thoughts for increasing the numbers of office patients but that they hold out no real promise for the patients. In his years of work on focal infective prostatitis he has accumulated records of a goodly number of men whose prostatic secretions were normal over a period of years but who later developed prostatic hypertrophy. He has seen a far larger number of men in the early stages of prostatic hypertrophy whose glands were infected and who, because of distant focal infective symptoms, have received prostatic massage. Often, their prostatic secretions were rendered normal, but never was there the slightest reason even to suspect that the treatment had the slightest favorable influence on the hypertrophy. These glands steadily increased in size and, fortunately for the patients, most of the offending growths have been enucleated. Cases have been seen that presented no evidence whatever of prostatic hypertrophy during a course of prostatic massage as the result of which the prostatic secretion was rendered pus free. During the succeeding years of observation there began to appear evidence of beginning lateral lobe enlargement which, within a few years, grew to such size that no one could doubt the nature of the condition. Surely, if these men are correct in their preaching, the writer would have seen at least one evidence of it in all of his years of office urology. Instead, he has seen hypertrophy occur in infected and noninfected, massaged glands and in those that received no massage. The real truth about the entire matter is that we do not know why the prostate gland behaves in this extremely peculiar manner.

*Symptoms.*—While a fair proportion of individuals seemingly reach a stage wherein the prostate is greatly enlarged without experiencing any marked urinary difficulty, by far the large majority of such patients present suggestive symptoms long before they reach such a stage. A careful history of the former group almost invariably will elicit some symptoms of a highly indicative nature.

The most frequent early symptoms of prostatism, a term used to cover the varied conditions resulting from obstruction by the prostate gland, is the necessity to arise at night to urinate. While it is almost a rule for men past middle life to arise once at night to empty the bladder, few of them experience the amount of difficulty in starting the urinary stream so common to those with vesical outlet obstruction. In these patients there arises the necessity of waiting a long time to start the stream and when it does start it seldom shows much force. Not only do they have difficulty in starting the stream but, often, they are conscious of a difficulty in finishing the act and frequently feel that they have not entirely emptied the bladder. They show a tendency to dribble urine for some time toward the end of urination. Their most uncomfortable time is from the early morning hours until

arising. There may be some pain if the quantity of residual urine is great. Though the patient usually strains to start the stream, he often finds that he is not greatly aided thereby; in fact, at times it increases his difficulty. Almost always the stream is lazy and lacks propulsive force.

These symptoms may continue for years and show little increase. Usually, however, they increase in severity and if infection supervenes there commonly is great vesical distress and an increasing frequency of urination. Even in the absence of infection the augmenting residual in many cases ushers in a frequency that is present both day and night.

At times these symptoms are almost or entirely lacking and the first intimation of obstruction comes from an acute retention of urine. Usually this follows exposure to cold, excesses in drinking or eating or failure to empty the bladder until long after the desire has presented itself.

Upon occasion the obstruction is so great that the patient does not void for a long period of time and establishes an overflow or retention wherein there is a constant dripping of urine or frequent spurts of a dram or two. As the condition advances renal decompensation, the result of back pressure, enters the picture. If infection is present there develops a urinary toxemia. In either event there is a steady or sudden reduction in bodily vigor. The blood urea steadily rises and unless relief is obtained death is not far off.

Bleeding is not an uncommon symptom in the presence of marked prostatic hypertrophy. It may be free and dangerous hemorrhage or the expulsion of a small quantity of blood at the beginning or end of urination.

In some individuals the vesical stagnation of urine, together with other unknown factors, is a fertile source of calculous formation and there may be added to the picture the distressing symptoms that calculi can cause. Often, however, calculi may be present without adding greatly, if at all, to the patient's symptoms.

While there usually is a reduction in sexual desire and vigor in advanced prostatic hypertrophy, the early stages not uncommonly are marked by an increase in both of these. Frequent and vigorous erections give the patient a false idea of youth wherein he is prone to enter sexual alliances that soon lead to disappointment for some youthful partner.

In his masterly and terse way, Keyes<sup>1</sup> delineates three types of clinical behavior of patients with prostatism which are so well described as to offer the best of excuses for quoting them verbatim.

**The Usual Type.** The symptoms begin with nocturnal frequency and difficulty of urination. This increases gradually and the patient passes on through the first, second and third stages as described below.

**The Acute Complete Retention Type.** Acute complete retention of urine may supervene at any moment in the course of the disease. It is the first symptom of importance in almost half of the cases.

If properly treated it may sometimes be relieved and the bladder resume its ability to empty itself satisfactorily. But if the infection cannot be controlled or if some residual urine remains the acute complete retention will soon recur. Very few patients with acute complete retention escape further trouble within the year. Yet they may escape for a number of years without any further symptoms.

"Urinary Toxemia: The patient with a tolerant uninfected bladder may never have an acute complete retention of urine and may not concern himself about his gradually increasing frequency of urination. He may thus reach a condition of chronic distention of the bladder and kidneys without consulting a physician. Under such circumstances the first condition that he notes is a *loss of weight and strength accompanied by constipation and dry mouth*. Even these he may not note until slight infection adds fever to his symptoms. Such patients, unless carefully examined, may be treated for digestive disturbances for a considerable time, though the mere laying of a hand upon the lower belly identifies the distended bladder and intelligent investigation of the patient's history reveals polyuria, frequency of urination and dry mouth."

*Diagnosis.*—Considering, as we here are, the broad question of vesical outlet obstruction due to both prostatic hypertrophy and median bar, it is obvious that rectal palpation of the gland is not so infallible a method of diagnosis as general impression would indicate. For, as previously has been stated, approximately 53.1 per cent of such cases show no change in the size, shape or consistency of the gland that would warrant one in saying that the patient's symptoms are or are not due to prostatic obstruction. Thus, we see that this highly valuable means of diagnosis has its definite limitations in the diagnosis of the cause of vesical outlet obstruction. Positive findings are reliable but negative findings may, and often do, deceive the examiner. They are not to be relied upon.

In cases of lateral or lateral and median lobe enlargement, rectal palpation attains its greatest value. While, upon rare occasions, the gland early may extend upward toward or into the bladder, causing much obstruction and giving questionable rectal findings, by far the large majority of such cases give rectal findings of the most convincing sort. In the early stages of the enlargement doubts often arise as to whether the patient has a normally large gland, a congested one or a true prostatic enlargement. In this regard, the greater margin of error occurs in large, heavy-boned individuals who normally have a larger prostate gland than is the case with small or average-sized men. As has been said under "Rectal Palpation," prostates and feet vary in size and what is normal to one would be much out of place in a smaller man. Also, what may be normal to one man may be hypertrophy in the smaller man. Again, except in individuals who have had much fibrosis of the gland as the result of infection, the prostate varies with age and at sixty it normally may be twice as large as it was in the same individual in the third decade of life.

Thus, it can be seen that the value of rectal palpation for prostatic obstructions may depend entirely upon the experience and knowledge of the examiner. Mistakes are made most commonly by those with little familiarity with the gland, per rectum—a fact that gives value to the digital examination of many prostate glands, for it is only by this means that diagnostic accuracy is to be gained. Particularly is this true when it comes to the differential diagnosis of prostatic hypertrophy, tuberculosis, and carcinoma, which have been discussed under their appropriate headings, as well as under the heading of Rectal Palpation. Unquestionably, rectal palpation should be carried out routinely on every man presenting any symptoms referable to the bladder and prostate gland, it should be done in

every male patient beyond the age of forty years, and it occasionally reveals trouble in much younger man.

Not only should rectal palpation be routine, but inspection, palpation and percussion should be equally so. It not infrequently happens that an enormously distended bladder is overlooked by a series of physicians for lack of these procedures. Randall's cases show many patients in whom much chagrin could have been avoided by such simple means.

These things having been done, what of that 53.1 per cent of patients so likely to give negative findings? Well, it is here that one frequently has to resort to urethral instrumentation and one who has seen the results of many such efforts knows how deadly they may be. There are few occasions in medicine wherein more judgment is required than in the selection of the time, the place and the patient for catheterization or cystoscopy. No matter how good the judgment, how wide the experience, how great the skill and how careful the technic, there are sure to be some regrettable misfortunes, perhaps some deaths. Too ready resort to instrumentation in these patients is to be deplored. The risks to the patient often are such that the experienced urologist dreads to be the first to pass an instrument into such a patient and experiences a sense of relief, particularly with aged or weakened patients, when he learns that someone has preceded him.

Catheterization should be approached with caution in all cases wherein there is reason to suspect the presence of residual urine. In them, it should be done under the strictest aseptic precautions and, if residual is found, an efficient nonirritating germicide should be left in the bladder at the end of the procedure.

In robust men the bladder rather safely may be emptied at once. In others it should be done very gradually, and those with chronic distention should be placed in bed and gradually decompressed, as has been described under the heading of Urinary Retention.

When catheterization is done, it should be carried out after the patient has passed all of the urine he can and the amount of residual urine should be measured. In this regard it is well to remember that many patients who have no true residual do not always entirely empty the bladder when another individual is present. Consequently, accuracy in findings is furthered if the patient is left alone while he tries to empty the bladder. It is well also to remember that there are other conditions aside from prostatic obstruction that can account for true or seeming residual urine. The neurogenic bladder, the diverticulated one, the hydronephrotic ureter, the tuberculous or carcinomatous prostate, the solitary cyst of the prostate and the bladder containing a new growth or stone—all these may show urine that the patient failed to expel at urination. Thus, we see that even the presence of a small or a large quantity of urine in the bladder after urination may give findings of a highly confusing nature.

Eventually, in an enormous proportion of cases, we are brought to a decision as to the advisability of cystoscopy. Nothing gives better diagnostic information than a visual study of the bladder, its outlet and the posterior urethra. And few things may be more harmful or deadly to the patient. It is here that a selection of the patients reaches its highest value, and it is here that the contraindications to cystoscopy should be weighed most seriously. So commonly has this procedure been injudiciously and

unskillfully carried out, that there are many well-thinking surgeons who go so far as to say that it should not be done at all in any case of true hypertrophy that is to be operated upon. Certainly this is no field for the inexperienced cystoscopist, and it is largely because of inexperienced work that such an attitude has been engendered.

Assuredly there are patients who should not be cystoscoped but, just as assuredly, they comprise a very small number of the patients suffering from prostatic obstruction. There is no great necessity for carrying out this study where the patient, at best, is a poor surgical risk and has every sign that one could ask for the making of a correct diagnosis. But there is every reason why it should be done where any doubt exists as to the true state of affairs, providing the patient presents no real contraindications to it. In at least 90 per cent of cases it presents no great hazard to the patient if properly done, and it reveals knowledge that makes it possible to decide just what should be done to correct the condition. The recent advances in the removal of prostatic obstructions have made preliminary study by the cystoscopic eye practically imperative in most cases, and have shown the fallacy and danger of a narrow-minded opposition to such study.

*Treatment.*—With the diagnosis of prostatic obstruction made, just what is one going to advise for the patient? To say that every patient with such a condition must have an operation is to lose sight of the fact that it is a particularly deadly operation for some few and that there are some others who may do just as well without any surgical intervention. Prostates are not removed just because they are larger than normal but because they are doing damage to the patient's urinary tract through obstruction to urination and secondarily because urinary obstruction sooner or later affects the general health. There are median bars and moderate-sized hypertrophies that exact a terrible toll in health and misery and there are enormous prostates that do no visible harm to the patient because they do not interfere with the proper emptying of his bladder.

In few fields is there greater need for individualization than is the case with these patients, and the laying down of rules is most difficult. One, however, may start with the definite knowledge that the bladder and upper urinary tract were not built for the purpose of withstanding back-pressure and that they invariably are injured when subjected to it for any great length of time. If, added to back-pressure, there is infection, the hazard is greatly increased. With one or two of these factors at play the patient's health and life are menaced, and the call is for the safest and most effective relief. The question to settle is, just what is best for the case in hand.

Unquestionably, it would be the ideal thing to remove the obstructing tissue in every case, but there are many considerations that come into the picture aside from the mortality of and possible morbidity from such procedures. So varied are these that they defy minute discussion. It, however, is possible to correlate the experiences of the past in such a way that they may serve as a basis for the weighing of each case on its own merits.

*MEDIAN BAR.*—In order not to complicate matters too greatly let us first dispose of the question of median bar formation. This lesion is a definite fibrotic condition which raises the posterior lip of the vesical outlet, interferes with vesical outlet dilatation, causes the patient to strain at urination, subjecting the bladder and upper tract to back-pressure

and, when it is advanced, it is sure to be associated with residual urine. Its age incidence averages are considerably earlier than prostatic hypertrophy, though it commonly is found late in life. It is seldom associated with attacks of acute urinary retention and it frequently is present for years before it annoys the patient enough to make him seek medical aid. It accounts for much vesical distress, is a fertile cause of vesical diverticulation and probably is more commonly overlooked than any other form of prostatic obstruction. Because it is associated with prostatic infection, it frequently is subjected to much instrumental dilatation and a large proportion of the cases are grossly infected before the diagnosis is made. Usually, however, the diagnosis is made before the patient reaches the condition that so commonly holds in hypertrophy and, as the lesion lends itself to correction by means of intraurethral procedures, such operations should be carried out on every patient who is in a condition to allow of removal of the obstructing tissue, which never is large in amount. Seldom is open operation necessary, unless it is for a complicating diverticulum or calculus. Rarely is catheter life tolerated and almost as rarely can the infection of the bladder and bladder urine be corrected for any length of time so long as the obstruction remains. It is unusual for the physician to be assailed with the doubts as to the proper thing to advise that so commonly intrude themselves in the presence of obstruction from hypertrophy.

**PROSTATIC HYPERTROPHY**—Turning to the question of prostatism from glandular hypertrophy, we find an entirely different story. The higher average age incidence, the fact that there frequently has been greater reduction in general health, the acute emergencies that arise, the wide variations in type, the prevailing mortality and the common morbidity following operation, produce a maze of factors that make of it one of the most difficult fields in all of medicine for giving the best advice to each patient.

There are several factors that stand out in rather high relief and serve to help in these decisions. We know that catheter life generally is an unhappy, dangerous, and usually brief existence, that residual urine gradually increases in quantity, that, even in the absence of great back pressure, the interference with sleep occasioned by nocturnal frequency undermines health, that infection and back pressure are highly dangerous things, and that patients presenting any or all of these things grow worse and not better. On the other hand, we know that a prostate properly and successfully removed before these things have gone so far cures the patient and adds years to his life.

Decision as to operation then, in the presence of these things, depends solely upon the patient's ability to stand an operation of the type best suited for the particular type of prostatic enlargement he may have. Determination of this is a matter of the estimation of cardiorenal and other factors which have to do with vital function and, upon their results, should the question of operation or no operation rest. It should be remembered that the day has passed when prostatic patients should be subjected to operation without the closest preliminary studies and the most careful preparation. Emergency prostatectomies no longer are done, and few surgical procedures have become more highly specialized.

What of the patients who do not have residual urine in the presence

of prostatic hypertrophy? Often they lack, and continue for years or for life to lack, those things that urge the necessity for operation. Usually, they are patients with enlargement of the lateral lobes alone, though, at times, one sees patients with pronounced enlargement of the median lobe alone, who entirely empty the bladder. They have only slight frequency of urination and little or no difficulty in starting the urinary stream, and they usually are uninfected. Some of them have enormously enlarged prostates, per rectum. An occasional one has an attack of acute retention of urine which, after one or more catheterizations, disappears. After this there may be no further urinary difficulty. In some there are recurrences. Often these patients are robust individuals well on in years.

Lacking those indications that make operative interference almost imperative in other types of obstruction, they often present quite a problem to him who would do best for all patients. Shall he urge operation, or shall he watch and wait? The answer is not always an easy one. Faced with the fact that all operative procedures aimed at the removal of vesical outlet obstructions carry a varying mortality and a less varying morbidity, one often hesitates to insist upon surgery. On the other hand, the knowledge that a percentage of even these patients reach a stage where operation becomes a life-saving procedure makes one hesitate before advising a policy of watchful waiting.

No matter which course he pursues he may live to find himself in error. Hence, it probably is the safest plan, unless there are reasons why operation should not be done, to let the patient take his choice after all of the facts have been presented to him. And it is best not to paint the nonoperative picture in too glowing terms. It is perfectly true that most of these latter patients can live to die of old age without any great urinary difficulties. In fact, most of them can. The writer has followed for a number of years patients in whom, for some reason, operation held too many hazards, and others who refused operation. Some, studied years ago, are living in good comfort today, some are dead of things in which the prostatic hypertrophy was not a factor, several developed residual urine and were operated upon. None had reason greatly to regret the course chosen.

If a conservative plan of treatment is followed, such patients should be studied at least once a year for possible residual urine. If such residual urine does develop the patient immediately leaves this present classification and joins that far greater group of patients in whom operative intervention usually transcends in importance all other forms of treatment.

What of the patient with infected residual urine who is in so weakened a condition, for one reason or another, that he cannot stand any type of operation? Here one has no choice, but is forced to do what he can to prolong life and make it as comfortable as possible by the use of the catheter. And whether he carries out intermittent or permanent catheterization depends largely upon the type of patient he has to deal with. The highly nervous patient rarely does well on continuous catheterization; he cannot habituate himself to its constant presence. In him, one usually is compelled to resort to intermittent catheterization. Where neither serves the purpose it may be necessary to resort to suprapubic cystostomy. Since these procedures have been discussed at length under the heading of Catheterization the reader is referred to that chapter for their consideration.

*Operative Procedures*—So much controversy has been indulged in of late about the best way in which to relieve prostatic obstruction that it behooves every physician to have some knowledge about what each has to offer. The furor that followed the introduction of the so called electric excision of prostatic obstructions not only has done much to fog sane thinking but it even has reached lay ears to the extent that patients themselves often try to do the deciding as to the type of operation to which they are going to submit themselves. Despite the insinuations to the contrary by those who first used it, electric excision gathered the reputation of being a minor operation that at last would deliver mankind from the dangers of the older methods. The pendulum, even in urologic circles, swung to ridiculous heights and, in some quarters, has remained there. Among those who are, perhaps, a trifle more observant, things have settled to a safer level.

Certainly, today, no one who has done any number of such excisions thinks of them as minor procedures. They know better, as others should have known when the leaders insisted that one did not become an expert at the procedure until he had operated upon at least fifty patients. They showed a mortality and morbidity in those first fifty cases that was, at least, striking, often appalling. We all should have known that nothing could be as good as this at first was said to be. Some of us did. Never has the writer felt more thankful for his nonsurgical bent than he has since he watched the struggle of those urologists who had left their surgical moorings to get back on solid ground.

The trouble has not been that the procedure was not one of the great urologic advances. It was simply that men unfitted by either cystoscopic experience or surgical judgment ventured far beyond their depths. Also, because a few insisted that it was properly applicable to all types of prostatic obstructions, others, far less skilful, followed the trail to the discredit of themselves and the undoing of many poor patients. It would be a simple matter to devote many pages to a discussion of the subjects opened up by this headlong plunge and the gradual retreat that has followed it in most quarters. And the writer knows of no better way to shake things down to a proper level than by repeating a recent occurrence. Seated at a table with a number of surgical urologists, he posed the following question, "When it is your turn to have a prostatic operation is it to be an electric excision or an enucleation?" Not a word was spoken but three of them started to scoop some imaginary thing from the palm of the left hand with the right index finger. And no one raised a dissenting voice, though all of them had done many operations of both types.

Of course, all of these men had in mind real prostatic hypertrophy. They did not even mean to hint that electric excision had no wide field of usefulness. What was in their minds was that it replaced the punch for median bar and that it was of value in those cases of early hypertrophy where the offending tissue was of small amount. They knew it was a God-send to the patient with an obstructing carcinoma of the prostate. But beyond these points they would have none of it for themselves. What applies to them should apply to their patients.

So much for electric excision, but what of prostatectomy? Well, one has the knowledge that when the offending growth is out, it is out. He



does not have to wonder whether or not the patient has to have a similar operation one or more times in the future. He may also feel, with much justification, that there is little, if any need for greater morbidity in skilled hands than holds in excision. Just what type of prostatectomy should be done depends upon the pathology present and the skill of the particular operator with each type of operation. The writer has felt for a long time that the attitude of Randall was steeped in rare good sense, particularly in view of the fact that he was brought up in an atmosphere of perineal prostatectomies.

He divides his cases, briefly, about as follows:

**ELECTRIC EXCISIONS.**—Bar formations, very small obstructions due to hypertrophy and obstructing carcinomata.

**PERINEAL PROSTATECTOMIES.**—Those hypertrophies that are truly intracapsular and above which are no marked bladder pathology or large calculi.

**SUPRAPUBIC PROSTATECTOMIES.**—Those hypertrophies that push sharply up into the bladder cavity. Those cases in which renal damage gives value to a period of suprapubic drainage before prostatectomy (two-stage operation) and those cases having marked bladder pathology or large vesical calculi.

And when one brings this all down to its final analysis he readily sees that cases do not fit operations but that operations should be chosen that fit the indications presented by the patient, which indications are only to be determined by a careful study. They are matters to discuss when the findings are in. To spend too much conversation upon them earlier often means that one must reverse himself.

**Prostatic Carcinoma.**—With the possible exception of vesical malignancy, carcinoma of the prostate gland is the supreme *bête noire* of the urologist. No matter how great his skill and how wide his experience, it mocks him. Silently appearing on the scene, it generally has progressed so far before it is discovered that surgery, irradiation and all known procedures, at best, are only palliative. At worst, they are mutilating, at times, terrible. There are few more certainly fatal conditions.

It is this utter hopelessness that is prone to rush one into the advising of things that are far from being the kindest for the patient. In these days of surgical brilliance, wherein new procedures are widely accepted almost as soon as they are born, it requires much courage to deny the vaunted benefits of them to the doomed patient.

To one who for years has seen these things come and go, has heard the claims made for them and has watched the misery of patients subjected to them, there come some decidedly sobering thoughts. Foremost among them is the conviction that surgical enthusiasm has engendered impressions that do not accurately portray conditions as they really are.

We have come to think that not only do prostatic cancers grow rapidly but that all such patients suffer untold agony leading to the most painful of deaths. It is true that some of them are great sufferers, but it is equally true that many of them live in comparative comfort for quite a few years. And, strangely enough, few of these latter are found among those who have been subjected to either surgery or radium implantation. It is an unfortunate circumstance that these things have so little to offer for the patient, and it is obvious that there is a great need for an unbiased compari-

son of the clinical histories of patients who have escaped them with those who have not been so fortunate

*Etiology*—Almost nothing is known of the true cause of prostatic carcinoma. The fact that it is rare before forty five years of age when the prostate is in its state of greatest physiologic activity helps us no more than does the knowledge that cancers of other structures are more common beyond this age. There is practically no clinical evidence to suggest that infection, irritation or the sexual habits of the individual play any part in the causation of malignancy in this structure.

That so many investigators have reported the finding of areas of malignancy in upwards of 20 per cent of the tissue removed at operation for prostatic hypertrophy might suggest a causal relation to the latter. Two clinical facts however tend to void such a view. By far the large majority of the cases encountered fail to have true prostatic hypertrophy when the diagnosis of cancer is made. The development of carcinoma following prostatectomy for hypertrophy is extremely rare, a fact entirely at variance with our experiences in surgical procedures for known prostatic carcinoma. Further, the development of prostatic carcinoma in patients with hypertrophy who have been subjected to prostatectomy is of the extremest rarity. True carcinoma and hypertrophy may co exist in the same gland but the surgeon almost invariably knows at operation that such is the case.

Regarding this reputed frequency of carcinomatous areas in prostatic hypertrophy there is in reality room for considerable doubt. The opinion is based upon microscopic studies of the cytology of certain areas in prostates removed at operation. Hammond<sup>1</sup> placed it at 2 per cent instead of 20 per cent and said: "The important point is that where there is no doubt about the diagnosis the growth has always recurred in the prostatic bed. If 20 per cent of cases of simple enlargement really show malignant changes cancer of the prostate should have been a very common disease before 1910 when prostatectomy was not commonly performed. This is particularly so in view of the fact that trauma of the prostate was frequent as so many patients were on catheter life. Yet cancer of the prostate was no more common then than it is today." Randall's observations bear out those of Hammond in that he found carcinoma in association with hypertrophy in only a few of 222 cases at autopsy.

*Pathology*—Carcinoma may develop in any portion of the prostate gland though it is rare in the anterior portion. Beginning as a small area its physical characteristics vary with the rapidity of its growth. While there is a goodly amount of fibrous tissue formation in all prostatic carcinomata it naturally is greatest in the more slowly growing ones. In these latter it approaches a stony hardness to the examining finger. The formation of definite nodules is more common in the early stages of the disease. As the growth increases in size the nodulations may be lost in the general intracapsular tension and commonly they are little in evidence in those massive growths that have spread farther than the intrarectal palpating finger can reach.

The most common site for the development of carcinoma of the prostate is in one or both lateral lobes. The next most common site is the posterior lobe and least commonly it occurs in the subcervical lobe. Spreading

superiorly and laterally, it passes up under the bladder base, involving the seminal vesicles, and, often, the vesical wall, which it rather commonly infiltrates. As it spreads laterally, it becomes firmly fixed to the lateral pelvic walls, totally obliterating the normal mobility of the gland. With unfortunate frequency, it breaks through at the vesical outlet and involves the vesical mucous membrane.

Metastasis is frequent and usually has occurred before the diagnosis is made. Roentgenologic studies usually will show small or large changes in the bones, most commonly of the pelvis or spine. So characteristic are these changes that the roentgenologists at times are the first ones to suspect the presence of carcinoma of the prostate. For the symptoms of the lesion so commonly suggest things for which their studies are demanded. Almost any portion of the body may share in this metastatic malignancy.

Hammond divides the carcinomata into three clinical types as follows:

"(a) *The acute fulminating type*, that resembles an acute inflammation in its onset and spreads and leads to death in a few months.

"(b) *The disseminating type*, where though the growth is small, general metastases are present almost from the start.

"(c) *The scirrhus type*, where the growth remains localized for a long period and dissemination to the glands and to the viscera occurs later. This latter type is by far the most common."

*Clinical Course.*—With such variations in pathology, it is natural that there should be wide variations in clinical course. And, as the less unusual types are characterized by the more dramatic events, it is likewise natural that such cases should make so marked a mental impression upon the medical mind as almost to serve as a standard of what prostatic carcinoma must mean to the patient.

Thus, we have grown to think of its clinical course as one fraught with intense suffering from beginning to end. We have lost sight of the fact that the disease usually is far advanced before a diagnosis is made of it and that the months, perhaps years, that it has existed prior to diagnosis have not been spent in agony, as a rule. Often, the symptoms prompting study have been of comparatively short duration, though the amount of carcinoma present is great. In other words, our general clinical picture of the disease is that of the later stages of those patients who do suffer either from nerve-trunk irritation or urinary obstruction. We have largely lost sight of the fact that, in the great majority of cases, prostatic carcinoma is a slow-growing affair which may allow the patient to live quite a few years in comparative comfort, often to die of some intercurrent disease. Also, there almost invariably is some metastasis when the growth is discovered and it is the metastasis often that has started the search for an initial cancer.

That such is the case is borne out graphically in Randall's work previously alluded to. Here one sees the bladder and prostate illustrated opposite to the case history and pathologic findings. And, while the bladder at times shows evidence of prolonged back-pressure in the highly obstructive types, it more often is rather a good-looking bladder wall. More striking, is the fact that in the presence of enormous growths, the duration of symptoms often was but a few weeks or months. Further, it should be remembered that these are autopsy specimens found in routine studies on

the bodies of patients dying usually of intercurrent disease and that in most of them carcinoma was not even suspected at the time of death

Thus, we see that, from the standpoint of mapping out treatment, much could be learned from a review of the pathologic and clinical courses of the disease rather than to let ourselves be swayed into the doing of dramatic things that usually have little to offer beyond a quicker and often, a more agonizing death

*Symptoms*—The symptoms of prostatic carcinoma usually are symptoms due to obstruction of the vesical outlet, involvement of the bladder wall and lining, metastatic action on nerve trunks, or in distant organs and, occasionally, impingement on the rectal lumen. The most common symptom calling attention to the lesion is pain in the sacral region, in the back or down the thighs. These pains, when once developed are usually constant and severe in character. They generally are considered to be due to neuritis or arthritis. In fact, they frequently get much roentgenologic study and much treatment before the prostate even is thought of.

Where urinary obstruction is a part of the picture, it usually differs but little clinically from that of prostatic hypertrophy, with which condition it frequently is confused.

In the presence of extension to the bladder wall hematuria may be the first sign of trouble. This is soon followed, as a rule, by frequency of urination and the classical symptoms of cystitis. It is under this diagnosis that these patients commonly receive much treatment before cystoscopic study is resorted to.

Bladder base infiltration almost, or entirely may constrict the lower end of the ureter causing ureteral and renal symptoms to occupy a misleading part of the picture.

*Metastatic involvement of far distant organs*, such as the lungs, pleura, pancreas, retroperitoneal lymph nodes, bones and other structures, entirely may obscure by its symptoms the fact that there is a carcinoma in the prostate.

*Diagnosis*—The diagnosis of prostatic carcinoma depends so greatly upon rectal palpation as to place a great premium upon the value of such a study in all men beyond the age of forty five years. More and more this is becoming a routine in the practice of thoughtful clinicians. There still is room for much educational work along this line, as is shown by the large numbers of patients who fail to be thus examined even in the presence of highly suggestive symptoms. When such an examination does become routine it is possible that new chapters will be written regarding the outlook of these patients for it is probable that much of a curative nature could be done during the early months of the disease.

The outstanding characteristics of cancer of the prostate are firm nodulation in the early stages and broad infiltration with or without marked nodulation in the advanced stages, an infiltration that is of great density, often, of stony hardness. The prostate becomes fixed laterally, so that it has no mobility whatever to the finger.

There are few things likely to be confused with the advanced cases of cancerous prostate, but mistakes are easily possible in the earlier stages. The tuberculous prostate more nearly approaches it, as there are definitely hard nodules in it and it may be of considerable size. Prostatic tuberculosis

usually belongs to an earlier period of life and ordinarily it is possible to demonstrate the disease in either the seminal vesicle, epididymis, bladder or kidney, and to discover the tubercle bacillus.

Interstitial prostatitis, of which we used to hear much more than we do today, may develop nodules of sufficient size and density to cause confusion. Where doubt exists, a later study usually will give differential data, for failure to increase in size, as does cancer, leaves little doubt.

While the diagnosis of advanced prostatic carcinoma usually is a simple matter beset with few doubts, the determination of early carcinoma is not always so easy. One who carries out routine prostatic massages for focal infective prostatitis, a lesion so common to the cancer age, often encounters resistant areas in the prostatic substance which raise rather serious questions in his mind. It is rather common to find that one lateral lobe is noticeably more dense than the other, and it is by no means rare to encounter prostate glands that are far firmer throughout than is usual for this structure. Even the familiarity with the consistency of this gland that comes with years of experience does not always fit one to be too dogmatic in some of these cases. Often, it is well to withhold positive diagnosis for a few months to avoid unfortunate error one way or another.

In contradistinction to these doubtful cases one does not have to be too wary about pronouncing as carcinoma definitely hard nodules occurring in an otherwise typical benign hypertrophy.

It should be remembered that prostatic carcinoma starts within the prostatic capsule, a fact that helps in the presence of the definitely extra-prostatic areas of hardness sometimes encountered. Some of these are in the rectal wall and some are phleboliths. The indurated areas in the rectal wall so common to those who have had hemorrhoids treated by injection should not mislead.

If there are urgent reasons why time cannot be allowed to confirm a probable diagnosis, it is possible, by the use of a punch-trocar, to secure a small piece of tissue for microscopic study. This small trocar is passed through the perineum into the suspected area in the gland and its use is a simple procedure devoid of any great danger to the patient.

*Treatment.*—One approaches a discussion of the treatment of cancer of this region in this definitely surgical age with considerable caution. But, until surgical procedure can show more in the way of attractive results than it has, he is on rather safe ground if he views surgery in most cases as a thing to be advised with decided misgiving, if at all. Indeed, it usually brings decidedly regrettable results. This is to be expected when one considers that metastasis usually precedes diagnosis by months or years. Until it can show better results, it, for the sake of the patient's life and comfort, had best be limited to such things as the prevention of bladder and renal damage either by cystostomy or the removal of vesical outlet obstruction by electric excision.

What applies to surgery in advanced cases seemingly applies to an equal degree to the implantation of radium in the gland by one means or another. For it has registered decidedly few cures and, surely, it has made many lives shorter and more miserable.

The placing of radium needles into early, small nodules by way of the perineum is not open to the same condemnation. Particularly is it a good

procedure prior to the removal of an hypertrophy exhibiting a small dense nodule

Irradiation though rarely if ever curative does not deserve so summary a dismissal. True it occasionally seems to stimulate the development and spread of the cancer but on the other hand it more often has a salutary effect in the relief of the pain. Occasionally it checks vesical bleeding where the bladder is involved. More rarely it retards the spread of mucosal involvement for a time. Consequently x ray has a valuable place in the treatment mainly if not entirely as a means of making the patient more comfortable. The writer has never seen a cure from it but he has seen many patients relieved of pain thereby particularly if exposures are made into the perineum as well as at the usual sites of exposure. One frequently is in doubt as to just what to advise for a given case. Unquestionably there should be considerable hesitancy regarding the urging of the more dramatic procedures for they register few if any cures and they rarely prolong life greatly if at all. So long as one cannot hold out the probability more often even the possibility of cure the things of greatest importance to weigh regarding anything in the way of therapeutics is whether or not the patient's life will be worth living after it is done. One really is on safe ground today if he confines himself to palliative procedures and views the others as belonging to emergencies as they may arise. There are few other things in which watchful waiting is far more kind and heroic than a frantic stampeding into dramatic issues that are more likely to lead to undreamed of torture.

In the removal of carcinomatous tissue that is obstructing the vesical outlet the Stern McCarthy method of electric excision has registered a signal success. And it well deserves serious consideration in those patients who have residual urine and great difficulty in urination. With this procedure large amounts of obstructing tissue can be removed and such patients usually stand it well.

**Sarcoma of the Prostate Gland**—Microscopically proved sarcoma of the prostate gland is a rare condition. It should be suspected in those patients who before the age of forty develop large rapidly growing tumors in this region—not that all cases occur before that age for about 30 per cent of the proved cases have been in patients of greater years. An equal number however have been in children of ten years or less. Beyond forty years the incidence rapidly decreases with each succeeding decade until less than 2 per cent occur beyond seventy years of age.

**Pathology**—The character of the growth is of the round cell type in about 36 per cent and the spindle cell variety in 20 per cent. The remainder of the reported cases have been of the following characters: myxosarcoma, fibrosarcoma, lymphosarcoma, chondrosarcoma, adenosarcoma, leiomyosarcoma, angiosarcoma, rhabdomyosarcoma and giant cell sarcoma.

**Prognosis**—Apparently true prostatic sarcoma offers the most dismal of prognoses. In early life comparatively few survive as long as six months while in later life they rarely survive more than a year.

**Symptoms**—Often the growth is of considerable size before any symptoms appear. They then vary with the direction the growth follows and the pressure it causes. These range from those of other obstructive uropathies to the excruciating pains due to sacral nerve root or sciatic nerve

pressure, swelling of the lower extremities due to venous pressure or involvement, marked constipation from rectal pressure and, late in the disease, there is an increasing cachexia.

*Diagnosis.*—When a large, soft growth is found in the prostatic region before the age of fifteen years there seldom is any doubt regarding its character. After this age it is only to be confused with the enormous prostatic swelling so commonly found in acute inflammations of the prostate. These, however, are almost invariably associated with other demonstrable infection and, upon proper treatment, subside rather promptly. Tuberculosis may at times offer a confusing picture, though the tuberculous prostate usually is irregular and shows definite areas of induration. The same applies to carcinoma, wherein, though the gland may be regular in outline, its consistency is usually of almost a stony hardness.

Occurring after the age of fifty, it is, in its early stages, rather easily confused with benign hypertrophy. The rapidity of its growth, together with the rather early appearance of cachexia even in the absence of urinary back-pressure, and the even more early onset of sacral or sciatic pain should serve to prevent mistaken diagnosis.

*Treatment.*—The treatment of prostatic, and even other pelvic sarcoma is extremely disappointing, for usually, before diagnosis has been made it has metastasized widely. Surgery seems to have little, if anything, of a curative nature to offer.

Radium or roentgen-ray therapy, though not curative, frequently offers much from the standpoint of pain relief. Upon rare occasions the tumor mass reduces in size or almost disappears as the result of this treatment. The widespread metastasis, however, usually eventuates in early death. Cases in which patients survived for a number of years after intensive radiation have been reported. Comparatively few of these growths, however, have been proved microscopically to be true sarcomata.

*Prostatorrhea.*—This condition, long considered to be the manifestation of a serious urogenital disorder, now has been relegated to the domain of symptoms. As we have learned more and more about its cause, it has occasioned us less and less concern. The same cannot be said about the patient, however. Not infrequently, he finds reason to become decidedly alarmed about the matter, and it is for this reason that one should understand the problems involved. As these have been discussed under the above title in the section dealing with Urogenital Symptoms, there is little need to elaborate upon them at this point.

#### DISEASES OF THE SEMINAL VESICLES

*Seminal Vesiculitis.*—Under the section on gonorrheal and postgonorrheal prostatitis the writer has discussed to some extent his views on the frequency of seminal vesiculitis. These views are certainly not in accord with those generally held by most urologists, who consider that infections of the prostate and the seminal vesicles are associated so constantly that the separate designations should be dropped and only the word prostatovesiculitis used. Assuredly, the writer can find in his years of close study of these structures in health and disease nothing to substantiate such a designation. He will admit that, perhaps, every patient with a vesicular infection also has an infection in the prostate, but he finds no reason in the world

to say that every one with a prostatitis has an associated vesiculitis. In fact, he has no hesitancy whatever in saying that it is not so.

Some time ago he had an opportunity to review the answers to a questionnaire on gonorrhea sent to urologists. One of the questions of which was, "What do you demand for a diagnosis of seminal vesiculitis?" The answers were of a most illuminating type. A few were satisfied by that highly misleading thing, palpation of the vesicle. Most of them said that, because of anatomic association, they could not see how the vesicle could escape infection. If one used this argument with every similar system in the body we would be called upon to treat countless infective complications that we rarely see. The salivary glands would be constantly in trouble, every cold would mean infection of all nasal sinuses, a pharyngitis would have to be associated with a middle ear disease and the gallbladder and pancreas would have to share in every duodenal infection. Frankly, anatomic association is rather a poor diagnostic leg on which to stand, it is very weak science.

One would not take the stand that there is no such thing as seminal vesiculitis any more than he would say that there is no such thing as cholecystitis. But to tag a diagnosis of "seminal vesiculitis" on everyone who gets an infection of his prostate gland is to give to about 75 per cent of all adult males, at sometime during their lives, a type of infection that everyone admits is an extremely difficult one to cure.

If a little closer analysis were made of just what happens as the result of our therapeutic efforts for the cure of prostatic infections, efforts in which the seminal vesicles have been ignored, we soon should abandon all thought of the frequency of vesiculitis. For it is a fact that we can clear up gonorrheal and nongonorrheal prostatitis without paying any attention whatever to the seminal vesicles. This we certainly could not do in the presence of infection of a vesicle, for the prostatic infection would remain until the vesicular infection was completely and permanently cured.

We do know, however, from our autopsy, operative and clinical experiences that the seminal vesicle is, upon rare occasions, the seat of an infection. And it is this fact that makes consideration of the symptoms and treatment a thing of importance. Under the heading of gonorrhea this has been done at much length and we shall here consider only nongonorrheal, nontuberculous infections of these structures.

There are two, perhaps three, modes of infection, viz., retrograde (from the posterior urethra), hematogenous and, perhaps, lymphogenous. It is also possible that infection might take place from contiguous structures, but such a cause must be rare indeed. Our clinical observations, together with the excellent investigations of McCarthy and Ritter, show that the predominant mode of infection is by way of ejaculatory duct, by either back-pressure or continuity of mucosa.

*Symptoms*—To separate the symptoms due to an acute seminal vesiculitis from those of its associated prostatitis is by no means a simple task. In fact, as a rule, it cannot be done—nor is it often possible to make an absolute diagnosis of vesiculitis in the presence of acute prostatitis. Theoretically, at least, an acute seminal vesiculitis should give pain along the spermatic cords and into the testes, a thing one almost never encounters in such cases. There is, in the combined lesion, a sense of fullness in the



rectum, suprapubic discomfort and urinary frequency from an associated trigonal inflammation or congestion. There should be pain on ejaculation but such patients rarely have an ejaculation at this stage. Fever, rarely chill; malaise, at times; backache, leukocytosis and, upon the rarest of occasions, ureteral colic and renal pain from pressure on the ureter, are among the symptoms that might occur. There also may be distant symptoms of toxic absorption, such as arthritis, myositis and neuritis. Aside from frequency of urination due to trigonal inflammation, what urinary symptoms are present are mainly those of the associated prostatitis.

Chronic infections of the seminal vesicles are largely locally silent lesions, the urinary symptoms being those of the prostatic infection. Reputedly, sexual symptoms are common, but the writer has been unable to verify the thought. Pain on ejaculation is probably more from the associated verumontanitis than from the vesicles or ejaculatory ducts themselves.

More commonly, chronic seminal vesiculitis is the cause of distant focal infective symptoms, though in most such cases the prostate plays an equal part. Practically, there are no pathognomonic symptoms that would lead one to believe that a patient was suffering from chronic seminal vesiculitis, and even studies aimed at the determination of its presence give findings none too reliable.

Upon the rarest of occasions, there may be a fulminant infection of these structures which eventuates in true abscess formation, and there are reports of such abscesses having ruptured into the surrounding tissues, even passing upward to the peritoneum. Such occurrences may be exacerbations of a chronic infection or the result of an acute infection.

*Diagnosis and Treatment.*—The questions of diagnosis and treatment of seminal vesiculitis are discussed at length under the heading of Gonorrhea and what is said of the gonorrheal variety is equally appropriate for those cases in which gonorrhea is not a factor.

*Tuberculous Seminal Vesiculitis.*—Tuberculous infection of the seminal vesicles alone is, indeed, a rare condition. Such infection in association with prostatic or epididymal involvement is not rare. The vesicular involvement, however, rarely gives any symptoms suggestive of its presence and the diagnosis usually is made because other genital involvement has led to palpation of the vesicles. At times, it is impossible to make a diagnosis of tuberculous seminal vesiculitis. More commonly, there is sufficient irregular induration and nodule formation present to establish the diagnosis.

The lesion is far more silent than is prostatic involvement. In fact, about the only symptoms referable to it are those occurring in the extremely rare case when the infection breaks through the vesicular wall and causes a pelvic abscess. And, even then, a diagnosis of such a misfortune is made more commonly at autopsy than during life.

The treatment of tuberculosis of the seminal vesicles should be solely systemic unless there are evidences of abscess formation, when drainage may be imperative.

## CHAPTER X

### DISEASES OF THE SCROTUM AND SCROTAL CONTENTS

#### DISEASES OF THE SCROTUM

**Injuries to the Scrotum**—Despite its rather exposed location injuries to the scrotum are rather rare. They do, however, occur as the result of attempts at emasculation, stab wounds and direct contusions. Occasionally, there is formed a hematoma which may assume large proportions. Open wounds may be accompanied by considerable bleeding. Cases of injury have occurred wherein the entire skin of the penis and scrotum has been torn off.

**Treatment**—The treatment of open wounds of the scrotum does not differ from that of such wounds elsewhere. Bleeding should be controlled either by pressure and cold packs, or by ligation if necessary and possible. After bleeding has ceased, the absorption of the hematoma is greatly hastened by hot packs.

Where the skin of the penis and scrotum has been torn off, plastic surgery often is required. This is more particularly true of the penis than of the scrotum. For, as a rule, a new scrotum will be formed as is the case in scrotal gangrene. While the penis, too, eventually would be covered by skin, it is not likely to have the distensibility needed for erection as is that made of skin flaps.

**Cysts of the Scrotal Skin**—Owing to the large numbers of sebaceous glands in the skin of the scrotum sebaceous cysts of various sizes are not at all uncommon. Many of these are the size of a bird shot though, occasionally, they are as large as a centimeter or more in diameter. There may be one or there may be a large number of them of various sizes.

Occasionally these cysts become infected as do sebaceous cysts in other locations, and break down. When this happens, not only is pus obtained but some of the typical caseous material common to such formations can be pressed out.

As a rule, however, these cysts cause no trouble and safely can be allowed to remain. At times the patient insists upon their removal, which can be done by enucleation. The small ones are rather easily destroyed by electric fulguration under local anesthesia.

**Scrotal Edema**—A number of things can cause edema in the loose cellular tissue of the scrotum. The most common one is the edema of cardiorenal failure and, in this, edema of the skin of the penis also shares. Occasionally, it is the first sign of beginning general edema. Rarely, the condition follows marked inguinal adenitis and, even more rarely, it is caused by a poorly fitting hernial truss. As the result of an injury the edema may be due to a cellulitis and if this is so, the tissue takes on a red coloring instead of the pale watery appearance most commonly seen. Upon the rarest of occasions the condition may be a true angioneurotic edema.

Chronic edema may be confused with true lymph scrotum. Usually, such edema is due to the prolonged block of lymph channels by either adenitis, operation or mechanical causes.

*Treatment.*—Wherever possible the cause should be removed, whereupon the scrotum usually reduces rapidly in size. Where the cause cannot be removed the scrotum should be well supported by a suspensory or, if possible, a closely fitting jock strap.

In the presence of true cellulitis multiple puncture may be advisable and it is sometimes wise in the other varieties where skin tension becomes such as to endanger skin nourishment. If punctures are made they should be done under absolute asepsis and the dressings should be kept constantly wet with a mild antiseptic solution to prevent infection and encourage oozing of the edema fluids. The great sensitiveness of the scrotal skin to even moderately strong irritating solutions never should be forgotten, lest superficial gangrene be added to the edema.

In the presence of an angioneurotic edema the hypodermatic injection of from 5 to 10 minims of adrenalin solution usually relieves the attack. Efforts should be made to determine the true cause of the angioneurotic edema, however, to prevent recurrences.

*Scrotal Gangrene.*—The term scrotal gangrene has been used to cover an etiologic assortment that eventuates in an identical later clinical picture. For in practically all of them, there is sloughing away of the scrotal wall so that the testes and spermatic cords are exposed to view.

*Etiology.*—There is reason to believe that erysipelas is a cause occasionally, and Campbell reported a series of cases showing a long-chain streptococcus which aroused his suspicion of such an origin. Local trauma causing a thrombophlebitis may occasionally be a cause and Eisendrath suggests that even a thrombophlebitis of the pelvic plexus of veins may cause gangrene of the scrotum.

By far the large majority of the cases are of such obscure origin as to belong under the designation idiopathic until our knowledge is clearer than it is today. Poor body nutrition does seem to play a part, as does also lack of personal cleanliness. The condition rarely is seen among the more favored classes of humanity, but is found among those whose circumstances take them to the larger charity hospitals. It is rarely seen in the other hospitals, or in private practice among those who are well fed and well bathed.

Scrotal gangrene may occur in any type of citizen as the result of urinary extravasation, injury or urethral rupture from stricture of that canal. In such cases, however, the gangrene is seldom so general as to cause sloughing of the entire scrotal wall.

*Symptoms.*—Those patients whose scrotal gangrene is the result of erysipelas are usually far more ill than are those of the idiopathic group. In the former there is a sudden, almost explosive onset of chill, marked elevation of temperature, prostration and even delirium at the appearance of the scrotal swelling, at times preceding it. The scrotum becomes markedly edematous, painful and tender. The skin becomes red, tense and then gangrenous. The penile skin usually is involved in these patients and the slough may extend well up on the abdominal wall.

In the idiopathic cases the symptoms are milder. There usually is a

chill at the onset of the scrotal redness. Gangrene rapidly sets in and involves almost all of the scrotal skin. During this time (four to six days) there is elevation of temperature and the patient is slightly or profoundly toxic. A line of demarcation is rapidly formed and, when the scrotum sloughs away, the testes and spermatic cords lie exposed but in no other way affected.

The healing is one of the most remarkable of phenomena for it rapidly accomplishes the seemingly impossible by enclosing the testes in an entirely new scrotal wall.

*Treatment*—Gangrene sets in so quickly that there is as a rule little need to make multiple incisions for the relief of the edema. Of course, where the condition is due to urinary extravasation such incisions are imperative, and they should be made widely.

In most cases it is necessary only to relieve pain and apply wet dressings in the early stages. When the line of demarcation takes place the sloughed tissue should be removed as it loosens. Aside from this, the only local need is for mild wet antiseptic dressings, preferably potassium permanganate in from 1 1000 to 1 500 solution, and careful support to the testes in such a way that they are held up onto the perineum. After all of the necrotic tissue is removed healing takes place very rapidly, but it should not be retarded by allowing the dressings to become so dry that they are hard to change.

**Elephantiasis of the Scrotum (Lymph Scrotum)**—While the term elephantiasis of the scrotum belongs more particularly to those enormous scrotal enlargements rarely seen in this country and due to the *Filaria sanguinis hominis*, it also is used to designate those somewhat similar clinical phenomena due to prolonged lymph block.

As a rule the skin change in these latter cases is not confined to the scrotum but involves the lower extremities to varying degrees. The greater deformity, however, is in the scrotal skin, which becomes enormously thickened and hypertrophied, so that it may weigh many pounds. The internal structures of the scrotum remain unchanged.

*Etiology*—There are several possible causes of nonfilarial elephantiasis all of which have to do with lymph node or lymph channel blockage for long periods of time. Among these, the most common are involvement of the inguinal lymph nodes as the result of chronic inflammation (syphilis, tuberculosis, lymphopathia venereum, surgical removal of the nodes). Where the condition is due solely to lymph channel failure, its persistence is generally ascribed to the failure of absorption of previous inflammatory products in the scrotal wall.

*Treatment*—The treatment of all cases where the mass is of uncomfortable size is surgical removal with plastic repair to cover the testes. The extremely rare case due to syphilis demands antiluetic treatment.

**Epithelioma of the Scrotum**—Epithelioma of the scrotum is not of very frequent occurrence, being confined almost entirely to persons in occupations where some type of coal tar is constantly brought into contact with the scrotal skin and subjected to friction by either occupation, clothing or both. Having for years been found mostly in the chimney sweeps of England it came to be known as 'chimney sweep's cancer'. Recent investigations however have shown that one does not need to be a chimney-

sweep to develop this type of growth. Indeed, it is far more common in cotton spinners and others who work in mineral oil, fat, soot and lubricating oils. Lack of personal cleanliness in such workers seems to be a predisposing factor.

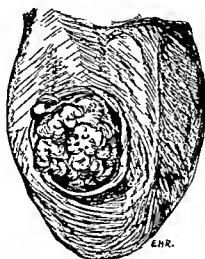


Fig. 200.—“Chimney sweep’s” cancer of the scrotum. (After Pean.)

*Pathology.*—The lesion usually begins as one or more soft warty growths which may persist for some months without change. The wart sloughs and leaves a slowly spreading ulcer associated rather early, as a rule, with



Fig. 201.—Epithelioma of the scrotal wall. (Stevens; Cabot's Urology, 1936, Vol. 1, Lea and Febiger, Philadelphia.)

involvement of the inguinal lymph nodes. The ulcer upon rare occasions becomes a large fungating mass.

*Diagnosis.*—All types of warty or ulcerous areas on the scrotums of those who come in direct contact with coal tar products of any type should be

viewed with much concern. If the least doubt of their true nature exists a biopsy should be carried out at once. For, being really malignant from the start, a proper diagnosis almost always can be made in this way. It is well also to consider lues as scrotal skin manifestations occur in this disease.

*Treatment*—The treatment consists of initial irradiation, wide surgical removal and postoperative irradiation for possible metastases. To temporize with such growths is to invite disaster for the patient.

*Pediculosis*—Pediculi are a not uncommon infestation of the pubic region and when present the scrotal hair frequently shares in the infestation. While either the *Pediculus vestimentum* or the *Pediculus humanus* at times may infest these regions the parasite most commonly encountered is the *Pediculus pubis*. This parasite which is better known as the crab louse is the one to which the French have given the poetic name of 'butterflies of love'. It is of a light brown color and easily mistaken for a small freckle. In diameter it is about  $\frac{3}{16}$  inch; the body is almost square and from its sides protrude three pairs of legs; the posterior two pairs terminating in sharp hooks by which the parasite attaches itself to the skin.

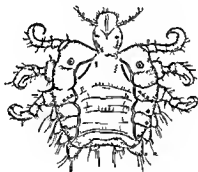


Fig 707—*Pediculus pubis*

The female slightly larger than the male lays eggs which are attached to the hairs and take almost a week to hatch. For this reason treatment usually is ineffective unless it is repeated at that interval so as to destroy the newly hatched parasites.

Infestation results from the transfer of the parasite from person to person during coitus. Occasionally the toilet seat is blamed. One who has tried to pry these parasites loose from the skin is likely to view this explanation with some skepticism though he must admit its possibility.

While the parasite usually confines its activities to the region of the pubic hair, it, at times, infests the hair of the torso and even of the eyebrows and head. It clings to the skin at the base of the hairs, while the nits are to be found fastened to the hairs themselves.

*Treatment*—Probably the best and cleanest way to get rid of the parasite is to apply 1:2000 bichloride of mercury solution to the parts twice a day for three days and to repeat it three days later for another three days. In fact, alternating three days on and three days off for two weeks is a good plan. If the surface covered is large it is wise to carry out the second and third series of applications only once a day. The nits can be stripped from

the hairs by means of a pair of thumb forceps or the matter can be left to the later bichloride washes.

Mercurial ointments, unless greatly reduced in strength by the use of more ointment base, are not without danger. If made one-half or one-fourth strength they rarely cause trouble and, though messy, are eminently efficient if used at the intervals given above. An ointment of 1 per cent ammoniated mercury is equally efficacious. Herman advises tincture of larkspur with 3 per cent acetic acid. According to him, if applied liberally to the area and allowed to dry there, this destroys both the parasites and the nits.

Scabies.—This skin infestation, produced by the *Sarcoptes scabiei*, is occasionally seen about the genitalia, to which it is transferred from the infested hands. This parasite is an extremely prolific one and, according to Stitt, a pair of mites may produce 1,500,000 descendants in three months. The female mite is visible to the naked eye as a small grayish spot, whereas the male cannot be seen without magnification.

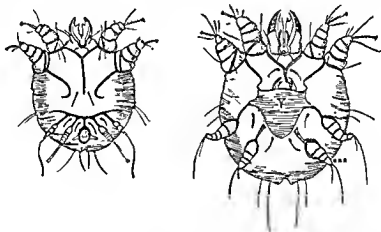


Fig. 203.—Male and female *Sarcoptes scabiei*—itch mite.

The male parasite remains on the skin surface, only the female burrowing beneath it. She makes a linear burrow, depositing her eggs as she travels. The eggs hatch in four or five days and the female matures in about fourteen days. The male dies after copulation.

**Symptoms.**—The outstanding symptom is almost intolerable itching, which is much worse at night. The burrows ranging from  $\frac{1}{4}$  to  $\frac{1}{2}$  inch in length are quite characteristic. They often are obscured by scratching, but the small scratch marks usually are to be found in chains. The scrotal lesions usually are associated with lesions on the sides of the fingers and, frequently, on the flexor surfaces of the skin. At times, the entire body seems to be involved. The face rarely is affected except in early infancy.

**Treatment.**—Not only must the treatment of scabies be applied to the patient himself but attention must be given to the clothing he wears and the sheets between which he sleeps. These latter should be changed daily and boiled. Even those with whom he comes into direct contact should be inspected and treated if found infested.

So far as the patient is concerned, the application to the surface of some form of sulfur usually eventuates in cure. This may be done by means of about a 5 per cent sulfur ointment. Before applying the ointment it is well to have the patient scrub himself briskly with soap and water to open as many burrows as possible. Particular attention should be given to the lesions on the hands.

A common, and rather effective way of treating scabies, is to have the patient shake powdered sulfur into the meshes of his socks and under clothing. It is best not to continue the dermal applications of sulfur in any form for a long period of time, as it causes a marked dermatitis in not a few persons. The usual procedure is to use sulfur for three days and then give three days' rest. Should dermatitis follow the treatment it usually can be controlled quickly by the use of calamine lotion.

In infants and others with sensitive skins, an ointment made of 1 ounce of styrax to 2 ounces of leaf lard is efficacious. For those with an idiosyncrasy to sulfur Fantus advises an ointment of from 5 to 10 per cent beta naphthol.

**Intertrigo**—This form of chafing not uncommonly is seen on the scrotum and the apposed surfaces of the thighs in summer time. It is more common in children and fat individuals. Lack of cleanliness, irritating clothing, strong soap, parasitic infestations, or yeasts may be among the causative factors. The latter is particularly so in the presence of diabetes.

The skin lesion varies from hyperemia to a true epithelial denudation and invariably starts where two skin surfaces are together. It spreads somewhat and usually is sharply margined. There is a burning sensation of the affected surface associated with sensitiveness. Often, itching is a prominent symptom. Upon rare occasions a true pyoderma results.

**Diagnosis**—The diagnosis rarely presents any difficulty, but one should be on the alert for systemic diseases, particularly diabetes. The location of the lesion, its sharp margination and the ease with which it usually can be cleared up seldom leave one in doubt. It is well, however, to rule out the presence of yeasts and fungi.

**Treatment**—Commonly the only treatment needed is a mild dusting powder, such as one composed of one part of zinc oxide and four or five parts of talc, together with some soft dressing to keep the skin surfaces apart.

Since excessive sweating frequently is a factor, the condition, if seen early, frequently can be checked by applying a wash of 1 part alum to 4 parts of water to the region by absorbent cotton, and allowing it to dry before the surfaces are apposed.

Zinc ointment, Lassar's paste or 1:3000 potassium permanganate solution (as a wash) often do good. If the lesion is moist and shows much exudation it frequently is benefited by the application of a 1 or 2 per cent salicylic acid solution. Where itching is a prominent symptom, x-ray exposure usually will check it promptly and, often, will cause the lesion to disappear.

To prevent recurrence the parts should be kept scrupulously clean. Systemic factors, if present, should receive attention and the scrotum should be separated from the thigh by a suspensory.



## DISEASES OF THE SCROTAL CONTENTS

**Nonspecific Epididymitis.**—Under the designation, nonspecific epididymitis, are generally included those cases of epididymitis not due to either gonorrhea, tuberculosis or syphilis. While such cases of epididymal inflammation are not common in office practice, they are by no means infrequent in hospital and dispensary practice. The frequency of this condition in advanced prostaticism and following operations upon the prostate has caused many urologists to do a bilateral vasectomy for its prevention as a routine preoperative procedure. Campbell, after an analysis of 3,606 cases of epididymitis in Bellevue Hospital, found 326 to be of nonspecific causation.

**Etiology.**—Largely, nonspecific epididymitis belongs to the individual with obstruction to the outflow of infected urine from the bladder. This may be caused by prostatic obstruction, urethral stricture or even an abnormally small urethral meatus. Under such circumstances it is mainly a back-pressure problem.

Most of the cases of nonspecific epididymitis seen in office practice are associated with infections of the prostate and possibly the seminal vesicles. At times, these attacks follow urethral instrumentation, prostatic massage, or urethral injections at high pressure. Rarely, one encounters an epididymal infection in an individual who presents no demonstrable infection of his prostate, vesicles or urine. Such cases have been assumed to be of blood stream origin.

It, at times, happens that patients are conscious of the forcing of urine down into the epididymis upon a great physical exertion. If the urine is infected, an attack of mild or severe epididymitis is likely to follow. Being mainly of staphylococcal origin the onset of acute symptoms occurs from two to three days after the event, as a rule. This is in marked contradistinction to gonorrheal epididymitis which almost always follows within twenty-four hours of the forcing of infected urine into the epididymis.

The writer has seen several patients in whom, though the forcing of infected urine along the vas deferens frequently occurred, epididymitis did not follow. One of these patients not only could feel the fluid stretch his globus minor immediately after heavy exertion, particularly when he was tired, but had a definite swelling of the structure which subsided within an hour when he was in the recumbent posture. Upon one occasion he reproduced the condition in the writer's office. Though not really painful, it was uncomfortable and, because of its frequent occurrence, this man tried to keep his bladder almost empty during his hours of work as a huckster. In this way he frequently went for weeks without a recurrence.

The micro-organisms most commonly found are staphylococci, streptococci and colon bacilli.

**Pathology.**—The pathology of this condition varies little from that of gonorrheal epididymitis. There is a purulent inflammatory condition of the mucous membranes of the epididymal tube with considerable inflammation and edema of the interstitial structures. These latter may go on to the formation of multiple small abscesses or large accumulations of pus that must be evacuated surgically. Usually, however, the entire process undergoes resolution, frequently with the formation of scar tissue which later contracts and closes off the epididymal tube if it has escaped closure from its own inflammation.

In the milder cases this tubular obliteration often does not occur and the spermatozoa are not impeded in their exit. Recurrences of the epididymitis are not rare and one seldom finds evidence of a patulous epididymal tubule in an individual who has had two or more such attacks. There may be an associated hydrocele.

*Symptoms*—Nonspecific epididymitis gives the same symptoms as does the gonorrheal variety. Mild cases are however, commoner in young persons in whom the pain, tenderness and temperature disturbance are at a minimum and swelling is not great. On the other hand, there commonly are great pain, tenderness, swelling and temperature elevation.

As in the gonorrheal variety, infection descending along the vas may give, as its first symptom, great pain in the iliac fossa of the same side. If this be the right side it rather easily can be confused with acute appendicitis.

*Diagnosis*—The condition is differentiated from the gonorrheal variety by the history and the absence of gonorrheal discharge, from the syphilitic by the history, the Wassermann test, and the fact that luetic epididymitis is usually neither painful nor tender. Tuberculous involvement most commonly involves the upper pole of the epididymis and while it usually is a slowly developing, practically painless lesion, it may at times have either an acute onset or exacerbation which in every way resembles the acute inflammatory involvements. In the tuberculous variety there is likely to be some nodulation of the epididymis or vas, involvement of the vesicle on the same side, perhaps the prostate and seminal vesicles and a history of tuberculous involvement elsewhere in the body.

The associated hydrocele may preclude the possibility of mapping out by palpation the size of the epididymis, but in most cases this is done with ease. It generally is possible to differentiate the testicle from the epididymal mass.

*Treatment*—Whether or not rest in bed should be insisted upon depends entirely upon the severity of the local symptoms and the temperature elevation. In most cases as in the gonorrheal variety, the patient may be kept ambulatory by the use of some dressing which gives both scrotal support and pressure, as previously described. Calcium gluconate given intravenously as advised in gonorrheal epididymitis is useful. In fact there need be no difference in the treatment from that of the gonorrheal variety.

As with gonorrheal epididymitis prevention is possible in many cases by the removal of causative factors and the judicious use of plans of treatment not likely to precipitate such attacks. Much of the postoperative epididymitis is now prevented by a preliminary vasectomy. This procedure likewise should be done in those patients having recurring attacks. In younger patients one should hesitate to advise vasectomy unless the repeated illness justifies such a procedure, and great care should be taken to have the patient understand that in all probability permanent sterility will be the result if both vasa are operated upon. Unless the vas is folded back on itself and ligated, sterility may not occur, for it has remarkable powers of regeneration and, if merely ligated and cut, it commonly will reestablish its lumen. No one knows just how long active spermatozoa will remain in the ampulla and seminal vesicle, for which reason the patient who has had a bilateral vasectomy should not assume he is sterile for quite a time after the operation. Otherwise he may be the father of some undesired children.

**Tuberculous Epididymitis.**—For years discussion has been waged regarding the mode of infection and the usual sequence of tuberculous infections of the genital tract. These, to some extent, have been discussed elsewhere. Until the several schools of thought reach some uniformity of opinion, which probably will be that all are correct in some cases and none are correct in all, there is little to be gained by a recital of the conflicting views.

Tuberculous involvement of the epididymis is by no means a rare condition, particularly in those with other urinary or genital tuberculous lesions. It is, however, a lesion that very easily can be confused with those of other

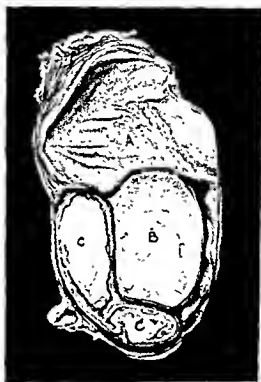


Fig. 204.—Tuberculosis of the epididymis. A, Hydrocele. B, Testicle. C, Caseated section of epididymis. (Department of Pathology, University of Pennsylvania.)

etiology, particularly with nonspecific and syphilitic swellings of the structures.

**Etiology.**—There is little to suggest that primary tuberculosis of the epididymis ever occurs. It is secondary to some other focus in the body. Its association with other urogenital foci is more common, though it does, at times, occur as the only lesion of this tract.

**Types of Infection.**—There are three types of tuberculosis of the epididymis as regards the mode of onset. The miliary type is of little real interest to the urologist as it usually is only a part of a general miliary tuberculosis which he seldom, if ever, is called to see. The urogenital symptoms are so overshadowed by the general ones that no one seems to

think the urologist could be of service, a view that even the urologist could not question

The acute type of epididymal involvement in every way resembles those caused by the nonspecific and gonococcal infections. The entire epididymis is swollen, painful and tender. There usually is an associated hydrocele and there may be some elevation of temperature.

The chronic, or most common type, is characterized by a swelling that slowly increases in size. This swelling is much more common in the upper pole than in the lower one. There is slight tenderness but no pain unless, as sometimes happens, there is an acute exacerbation due supposedly to a mixed infection. As time passes the epididymal mass usually becomes nodular in outline. At times, the condition starts as one or many rounded nodules which are quite firm to palpation.

In many cases, the epididymal mass becomes attached to the skin and ruptures through it. If such an outcome has not taken place during the first year it is much less likely to do so.

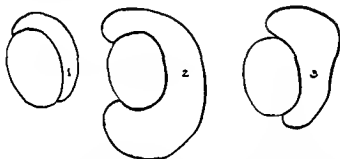


Fig 203 Outline of the usual shape of the (1) normal epididymis, (2) gonorrheal epididymitis (3) tuberculous epididymitis. Syphilitic epididymitis may resemble either 2 or 3.

**Diagnosis**—Unless there are other associated tuberculous lesions present, the diagnosis often must be made by excluding nonspecific lesions and lues. The former is particularly so in the acute cases and in the early stages of those of gradual onset. The latter is so in all cases, for syphilitic epididymitis at times begins much like the acute tuberculous lesions—it more often resembles the chronic, nodular form.

Thus, the history of the case as regards both tuberculosis and syphilis is highly important. Even in the absence of a definite luetic history a careful study should be made for the latter disease. The question usually can be answered by the Wassermann test, which is practically always positive in syphilitic epididymitis. To advise treatment without a Wassermann test is a great mistake even if there is other tuberculosis present.

**Treatment**—Here we meet with two schools of thought, which one readily can understand. The internist, who sees mostly those cases with active pulmonary tuberculosis or other massive lesions, often, is definitely opposed to operation. He bases his views upon the fact that he has seen a number of cases of miliary tuberculosis follow operation and that, as the other epididymis usually will be involved within two years, one gains little and may lose much by operation. He claims, with much justice, that those

epididymides that break through the skin usually play themselves out eventually and clear up, and those that do not rupture almost invariably undergo resolution if the patient survives his pulmonary involvement. They also point out that the epididymal lesion very commonly is only a part of a more general genital involvement.

Those of the other school of thought admit, to a degree, most of these things, but, as they see other types of patients, they hold that their contention is good for those types. Be this as it may, the fact remains that operation upon all cases is unwise and, as with other conditions, one must bring both judgment and clinical experience to bear upon the matter.

Where the mass is attached to the skin when the surgeon first sees it, epididymectomy without injury to the circulation of the testicle is not an easy task. Often, nothing short of orchidoe epididymectomy will answer the purpose, and patients do not often willingly sacrifice testes. It would not be so bad if one could assure the patient that the other side was safe. This, however, is far from being the case, as the other epididymis becomes involved in a majority of the cases. So frequent is this involvement of the other side that Keyes even advises removal of the well epididymis before operating upon the involved one.

Mistakes in judgment at times, bring rather pathetic results. Several years ago the writer advised against operation upon a tuberculous epididymis that had broken through the skin in several places. Contrary to that advice, the surgeon started to do an epididymectomy, got into difficulties and had to remove the testicle. A year later there was an acute involvement of the other epididymis which eventuated in gangrene and sloughing of the entire testicle leaving the young man a castrate.

If one adopts the palliative, nonsurgical view and the condition undergoes resolution, as it usually does, slowly, he should not lose sight of the fact that recurrences sometimes occur after considerable periods of time. In such a decision the time element is of considerable importance as comparatively few cases that have lasted a year or two undergo cessation with fistulization. This outcome usually occurs in the first two years or not at all.

Rarely, if ever, is operation a matter of emergency, and one opposed to surgical intervention often can let the changes of a few months help him in his decision. It must be admitted that, no matter which school is followed, the physician is traveling in good company. Neither side has cornered all of the truth, and the writer, as the result of much experience and observation, finds himself strongly opposed to the view that tuberculous epididymitis is, of itself, a call for surgery. While he has seen many attractive results of epididymectomy, he has seen enough sad results to make him ponder. Indeed, he finds himself rather closely aligned with those who think more of the patient as one with a systemic infection who, because of a temporarily lowered local resistance, has developed a local lesion that indicates the need for a more strict antituberculous régime. No less an authority than the late Lawrence Flick roundly scored promiscuous epididymectomy for this condition as ill advised and often highly dangerous.

**Syphilitic Epididymitis.**—There is belief in some quarters that an evanescent involvement of the epididymis and testis is of rather frequent occurrence during the secondary stage of syphilis. The French have had

say about this but very little is heard of it in other countries. If it does occur its manifestations are so very mild that they usually escape the attention of both the patient and the clinician.

Syphilitic epididymitis as we know it best is a manifestation of the tertiary stage. Usually there is some evidence of an associated orchitis and sometimes this is sufficient to overshadow the epididymal lesion. Some syphilographers doubt the occurrence of epididymal without testicular involvement but several seemingly authentic cases have been reported. Testicular without epididymal involvement seems not so rare.

*Pathology*—Almost any combination of conditions may be found. The testicle may be a large heavy firm mass to which is attached a mildly enlarged epididymis. The testicle may seem normal in size and consistency and the epididymis be greatly swollen. While in most cases the swelling of the epididymis is largely confined to the globus major it is possible for the entire structure to be enlarged uniformly. A nodulation that closely resembles the most usual forms of tuberculous epididymitis is by no means rare and is a potent source of error.

There usually is an associated hydrocele which often is of considerable size making palpation difficult if not quite impossible without tapping.

*Symptoms*—Aside from the scrotal mass there usually are almost no symptoms. Some patients complain of a dragging sensation particularly if the testicle is large and heavy. Some few have slight aching pain with slight tenderness.

*Diagnosis*—Certainly syphilitic epididymitis is no lesion for snap diagnosis for in few places does that syphilis slogan "The Great Imitator" more thoroughly apply. Not only is the syphilis missed but the tendency is to make a diagnosis of tuberculosis and advise epididymectomy. The writer once arrived in the operating room with a positive Wassermann report in his hand just in time to prevent the removal of the last one of a supposed pair of tuberculous epididymes. He missed saving the other by about two minutes.

Some years ago the writer saw a traveling man on whom six surgeons of note had made a diagnosis of tuberculosis of one epididymis and advised its surgical removal. When told by the writer that he made no diagnoses of scrotal masses without a Wassermann test the patient remarked that such a test was not necessary for him as he had had six negatives in five years. Neither of the surgeons had spoken of loes but the patient admitted infection fourteen years before for which he had been given mercurial treatment for eighteen months. The solution of the case was that the blood was strongly positive for syphilis and the epididymal nodules which were so typical of tuberculosis disappeared after four injections of neoarsphenamine.

One would make no mistake in the absence of other local lesions definitely of tuberculous origin to assume that no case was really tuberculous until syphilis was definitely ruled out. Where doubt exists it is far better to give a short course of small doses of antiluetic treatment as a therapeutic test before resorting to surgery if surgery is really indicated. In such doubtful cases large doses of arsphenamines probably should be avoided. If hydrocele is present and obscures diagnosis it should be tapped so that the structures can be palpated thoroughly.

An enlarged, heavy testicle with epididymal involvement is most likely to be luetic but, here again, one runs risks for the patient without a positive blood Wassermann. Testicular neoplasm rather rarely causes epididymal swelling that is not a direct extension of growth itself and rather easily differentiated from epididymitis.

*Treatment.*—No local treatment other than scrotal support is needed as the lesions rapidly disappear on the institution of properly planned anti-luetic treatment.

*Hydrocele.*—A hydrocele is an accumulation of fluid in some portion of the serous sac around the testicle, a persistent serous sac along the spermatic cord, or both. The congenital hydrocele maintains its connection with the abdominal cavity, while, in all of the others, this communication has closed. There are a number of varieties of hydrocele, as can be seen in Fig. 207. As to location, these depend mostly on the failure of closure of congenitally normal channels, or portions thereof, and upon the normal serous sac surrounding the testicle. Hydroceles have also been divided into the classifications of acute, chronic, unilocular and multilocular.

The true cause of chronic hydrocele is not known. Acute hydrocele is the result of trauma or infection in adjacent structures, the epididymis or testicle. With extreme rarity, it occurs in the acute infectious diseases, particularly mumps and smallpox, in which there may or may not be an associated inflammation of the testis or epididymis. Many theories have been proposed to account for hydrocele but, apparently just why the lesion forms and, particularly, why it so commonly persists in all but the acute cases, has not been answered. The accumulation of fluid in a serous sac as the direct result of acute inflammations, of course, presents no great mystery, at least, it is not uncommon. But why some of these spontaneously disappear and some persist throughout life is another matter.

Hydrocele usually presents as a resilient scrotal mass not particularly striking as to its weight, as is the case with most testicular new growths. It may be quite tense if its wall has become thickened but, as a rule, the feeling that one holds in his hand a sac filled with fluid usually is apparent.

Unless there is hemorrhage into the sac or it is complicated by hernia, it almost always is definitely translucent to transmitted light. This may be determined by placing a small light on the side opposite to the examining eye in a dark room or looking at it through a roll of cardboard or heavy paper in daylight. (Fig. 206.) As a rule, the testicle lies on the lower, posterior aspect of the mass. This is not invariably so, however, but its location generally can be determined by transillumination. Failing to locate the position of the testis by this means, careful palpation and gentle pressure on the structures between the examining thumb and finger usually will bring out not only the contour of the testicle but the pain so characteristic of pressure upon it.

Care should be taken, also, to rule out hernia by a careful study of the spermatic cord where palpable, the absence of impulse on coughing and the inability to reduce the size of the tumor by digital manipulation of the mass with the patient lying on his back. Congenital hydrocele, however, can be reduced but, being a condition peculiar to infancy, it rarely confuses.

Hematocele, spermatocele and chylocele may be more difficult of diagnosis without tapping and microscopic study of fluid from the last two.

Neither transmits light well and the first does not transmit it at all. *Puncture* however should not be done unless hernia can be ruled out absolutely.

The greatest care in the diagnosis of hydrocele in infants is necessary in order to rule out hernia. Both congenital and infantile hydroceles extend into the inguinal canal and each may give impulse on coughing. In hernia the mass is more boggy, does not freely transmit light and it usually can be reduced by taxis. In hydrocele alone the translucence is so outstanding as to demonstrate the small testicle with little difficulty.

*Acute Hydrocele*—As the term implies acute hydrocele is of rapid onset and is usually in association with epididymitis particularly gonorrheal with orchitis or as the result of direct trauma to the scrotum and its contents. The contained fluid may be either clear flaky from plastic exudate or even suppurative. As has been stated acute hydrocele may occur in some of the acute infectious diseases in the absence of inflammation in contiguous structures.



Fig 206—Transillumination of hydrocele

**SYMPTOMS**—The symptoms of acute hydrocele generally are largely those of the acute inflammatory process with which it usually is associated. Often the fluid accumulation is so small in amount that its presence is not even suspected being overshadowed by the epididymal or testicular swelling. Upon rare occasions suppuration takes place and fever is a prominent symptom.

**TREATMENT**—The treatment of acute hydrocele usually is palliative for in a large proportion of the cases spontaneous disappearance takes place. In the presence of a large accumulation of fluid it may be necessary to tap the hydrocele in order to make an accurate diagnosis of the causal condition. At times several tapplings may be necessary to cause resolution and at others the condition becomes a chronic hydrocele. If there is evidence of suppuration incision should be made before fistulation occurs.

The technic of the tapping of hydrocele is considered under that title in the section on treatment (page 286).

*Congenital Hydrocele*—**SYMPTOMS**—Congenital hydrocele is characterized by the appearance of a scrotal swelling shortly after birth which increases in size when the child cries or when it strains for any reason. The



mass is soft, usually pear-shaped, with the base downward. It can be reduced by gentle pressure, but it reappears when the pressure is relieved. It goes back into the abdomen slowly without the seeming thud so characteristic of the return to the abdomen of the last part of a hernial mass. In the absence of hernia it is brilliantly translucent.

**TREATMENT.**—Injection treatment never should be carried out because of the communication of the sac with the abdominal cavity. Some success has been obtained by the application of a truss. If this is not successful open operation should be resorted to between the third and sixth month.

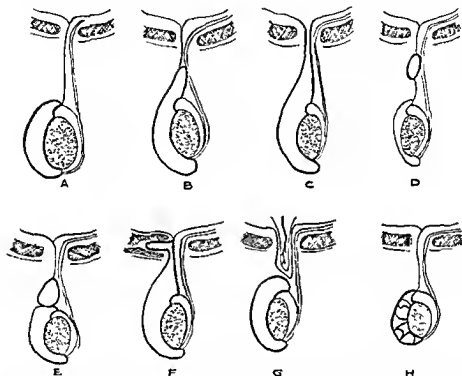


Fig. 207.—Various types of hydrocele. *A*, Hydrocele of the tunica vaginalis. *B*, Infantile hydrocele. *C*, Congenital hydrocele. *D*, Hydrocele of the cord. *E*, Hydrocele of the cord and of the tunica vaginalis. *F*, Hydrocele of the cord and tunica vaginalis simulating congenital hydrocele. *G*, Hydrocele of the tunica vaginalis with hernia. *H*, Multilocular hydrocele of the tunica vaginalis due to adhesions.

**Infantile Hydrocele.**—**SYMPTOMS.**—In infantile hydrocele the communication into the abdominal cavity has closed and the collection of fluid may be along the spermatic cord (hydrocele of the cord) or it may extend into the tunica vaginalis. Thus, it cannot be reduced by pressure as can the congenital variety. It is in all particulars like the adult varieties.

**TREATMENT.**—Thomson Walker states that multiple puncture of the sac generally cures the hydrocele. The writer has obtained cure from simple tapping. This may have to be repeated once or twice, rarely oftener. On the other hand, Keyes advises operation because of the common association of hernia with it. Owing to this frequent association with hernia injection treatment is contraindicated.

*Chronic Hydrocele*—**ETIOLOGY AND PATHOLOGY**—Under this designation have been included those hydroceles which starting as acute hydroceles, have persisted as well as those so called idiopathic ones that occur without apparent cause and slowly enlarge. These are usually monolocular. At times, they are composed of two or more distinct compartments. They usually are in the tunica vaginalis testis but, upon rare occasions they may extend up along the cord and even into the abdomen, though they usually have no direct communication with the peritoneal cavity. With extreme rarity, there even may be a minute opening between the sac and the peritoneal cavity.

Fortunately for the clinician these latter varieties are so rare that he may never see one, the usual type coming to his notice being the large unilocular hydrocele confined solely to the tunica vaginalis testis. He should however, be exceedingly careful that he makes no false assumptions but should carefully study each one for possible variations from this commoner type.

**SYMPTOMS**—Other than the annoyance due to the size of the scrotal contents, chronic hydrocele rarely, if ever causes any symptoms.

**TREATMENT**—The treatment of chronic hydrocele is either palliative or operative. In childhood tapping on one or more occasions may bring about cure. In youth and later life, withdrawal of the fluid is followed by gradual refilling of the sac. This usually requires three months or more and the painlessness and simplicity of the tapping is very likely to make the patient decidedly hesitant about submitting to operation which if properly done, is curative. It, therefore, is a better plan not to tap the hydroceles of younger patients unless they absolutely refuse operation.

Beyond middle life, tapping often is the better procedure, unless there are factors making operation advisable. Particularly is this more innocent procedure advisable after sixty years of age.

Much has been said, and still is being said about the cure of hydrocele by injecting into the sac of substances aimed at causing such an inflammatory reaction in the sac that its surfaces adhere and obliterate it. Most of these are dangerous and none are uniformly successful. Where the effort is not successful the development of multilocular hydrocele is not uncommon, making future tapping more of a procedure and operation far more difficult. Also, the period of convalescence following the injection method is but little, often not at all, shorter than that of operation.

**Varicocele**—A varicocele is a dilatation of the veins of the spermatic cord usually as the result of conditions lying within the abdomen. The pampiniform plexus of veins develops a number of varicosities, which vary in size from those that can be scarcely palpated to enormous masses that can be seen as irregular collections of worm like entanglements beneath the scrotal surface. Hinman thinks it is probable that in every male there is some demonstrable dilatation of the veins of the cord.

Varicoceles of size are most common in late youth and early manhood, showing a tendency to reduce in most cases after the thirtieth year. Less than 10 per cent of the cases are found after forty years of age. After fifty years they are rare.

**Etiology**—The cause of varicocele has been the subject of much discussion. As most of the cases occur on the left side (90 to 97 per cent), it

is rather generally agreed that left-sided varicocele is due to either faulty valve formation or weakened walls of the spermatic vein. The spermatic vein on the left side, it will be remembered, does not empty into the vena cava at an acute angle, as that of the right side does, but empties at a right angle into the left renal vein.

The reason for the rare occurrence of varicocele on the right side in the absence of direct pressure upon the vein, is by no means clear.

"Symptomatic" varicocele is caused by pressure upon the vein at some point either in the abdomen or inguinal canal. The conditions most commonly causing symptomatic varicocele are intra-abdominal new growths, hydronephrosis, pyonephrosis, enlarged lymph nodes or the pressure of a truss.



Fig. 208.—Outline of the marked venous dilatations of varicocele.

Because varicocele is most common in young unmarried men (81 per cent), it naturally has been supposed to be due, also, to prolonged sexual congestion. Some even have blamed it on sexual excesses.

**Pathology.**—Aside from the fact that there are present many thin-walled venous dilatations and tortuosities, perhaps some fatty infiltration and areas of sclerosis, the thing of most importance from a pathologic standpoint is the change that may occur in the testis. Barney reports that 11.5 per cent of his cases of varicocele showed some testicular atrophy. By this he means that the corresponding testicle is smaller than its fellow, and he further states that after operation these smaller testes often increase in size.

**Symptoms.**—Most varicoceles produce no symptoms whatever and are discovered accidentally by the patient or by the physician during examination. They are not large and, if the patient's mind is at rest regarding the condition, no harm is done and no treatment is needed.

Some small varicoceles, and some of the larger ones, produce pain, or the patient thinks they do, for some patients complain of a dragging sensation and aching pain in the testis, in the back and down the thighs. Strangely

enough the very large varicocele generally produces no symptoms other than the annoyance of its size

The sexual disabilities so commonly found in patients with varicocele are probably due to psychic causes for there is no reason why such a lesion should cause any sex disturbance. However associated sexual disturbances are of such common occurrence that the physician should make it a point to inform every such patient of the true state of affairs. If the testicle is noticeably smaller he should know that even that need have no influence on his sex life unless he allows his mind to produce difficulties.

*Diagnosis*—The diagnosis presents no difficulties whatever for the mass feels exactly like a collection of worms. In the presence of a large varicocele the testicle hangs much lower and the scrotum usually is more relaxed on the affected side. Examination should be made with the patient in the upright position as the veins often empty almost completely when he is recumbent. Thus takes place without the gurgling so common to reducible hernia.

*Treatment*—The experiences of the World War did much to throw discredit upon the previously rather general custom of operating upon varicoceles of almost any type. Many of those who had been subjected to the operation during the early days of hostilities became so neurotic that they were no comfort to themselves nor those around them. Neuralgia of the cord and all sorts of local symptoms with an equally baffling therapeutic outlook were so common that operation found itself almost taboo.

Even in the presence of previous pain which had been an indication for surgery one could not assure the patient that it would disappear. Beginning atrophy of the testicle another indication for surgery was not always checked by the operation. And thus it became general opinion that operation was the last thing to think of certainly not the first.

When a small varicocele undiscovered by the patient is found at examination it is best not to tell the patient of it. Certainly if he is to be told he should be made to understand the cause of it and that it is largely a matter of no moment. If a varicocele is of any great size or is creating mild symptoms or if the patient is worrying about it he should be told what it is and instructed to wear a scrotal suspensory. One never should lose sight of the fact that even the slightest abnormality of the external genitalia is one of the most fertile causes of mental fixations that may lead to a definite psychoneurosis unless the patient is made to understand.

For patients with large varicoceles that do or do not produce local symptoms it is well to advise a tight fitting jock strap for from several months to a year and then change to a suspensory.

Operation as has been said should be viewed with doubts and reserved for the patient who insists upon it and is willing to take his chance of having as annoying symptoms thereafter. Of course there are many such patients who are operated upon with entire satisfaction. Also there are many who are or think they are worse. Unfortunately one cannot select the cases.

To try to remove a so called sexual neurosis by operation is often to invite a suit for surgical malpractice. Particularly is this so if there is beginning testicular atrophy for the patient is almost sure to blame the surgeon if the organ becomes smaller thereafter or even if he only thinks it does. If

one is unfortunate enough to get a postoperative testicular gangrene he may spend much money with great speed.

So far as the outlook from operation is concerned, Hinman<sup>1</sup> has summed it up as follows:

"Indiscriminate operations upon varicocele cannot be too highly condemned, and in no case should operation be undertaken without a full knowledge on the part of both physician and patient of the probable end results. Removal of the veins does not help the circulation, and atrophic changes may occur in the testicle. (Nivastro, 1922, Douglas, 1921, Bloodgood, 1918.) Frunkin (1924) and others have warned against operation because of the frequency with which it is followed by hydrocele. In 106 cases followed by Douglas, hydrocele occurred in 35 per cent. Comer found it in 23 per cent of 100 cases. In 2 per cent the varicocele recurred; 14 per cent of the patients complained of pain in the testicle, and 5 per cent, of pain in the scar of the wound; 26 per cent were unimproved and 4 per cent declared themselves worse. Of 39 patients followed by Barney 36 per cent still complained of pain in the testicle or groin; 31 per cent complained of tenderness in the testicle, and in 27 per cent sexual hypochondriasis was still present; 15 per cent had recurrence of the varicocele. Douglas reported atrophy in 4 per cent of 116 cases."

Surely, such figures should make one consider carefully before he advises surgical removal of the mass of veins. Those who develop symptoms after operation become decidedly discouraging patients for any physician and they not uncommonly do much to discredit surgery in particular and the medical profession in general.

**Spermatocele.**—A spermatocele is a cyst of the epididymis. Occasionally it ruptures into the tunica vaginalis testis and partakes of all the characteristics of a hydrocele except that of brilliant translucency. Most spermatoceles are small in size (1 to 2 cm. in diameter) and are felt as a round, resilient body at the upper pole of the epididymis. When larger they commonly are erroneously mistaken for supernumerary testes, and, in fact, they do feel very much like those organs on palpation. Those of larger size generally are assumed to be hydroceles, of either the cord or the tunica vaginalis testis, until a study of the contained fluid reveals their true nature.

The fluid of a spermatocele is very different from the usual limpid yellow contents of the hydrocele. It resembles more nearly the appearance of greatly diluted milk. Upon microscopic study it usually is found to contain large numbers of spermatozoa, some of which may show motility. At times, no spermatozoa are present and the general appearance of the fluid and its sediment is so much that of milk that the name galactocoele has been applied.

**Symptoms.**—Other than the possible weight and size of an extremely large spermatocele, the condition gives no direct symptoms. It is not, however, rare for individuals of a neurotic type, with small spermatoceles, to develop psychogenic sensory symptoms.

**Diagnosis.**—The determination of the nature of these cysts when of small size usually can be made by palpation alone. When larger, they are

<sup>1</sup>Hinman, Frank: Principles and Practice of Urology. W. B. Saunders Co., Philadelphia, 1935.

differentiated from true hydrocele by their lessened or absent translucency and the microscopic study of their contents. The utmost care must be taken to rule out hernia.

*Treatment*—The smaller cysts need no treatment if the patient is convinced that they are of no moment.

The treatment indications for the larger cysts are practically those of hydrocele. If tapped they recur if they are operated upon the greatest care must be taken to resect the sac completely and tie off its connection to the epididymis if recurrence is to be avoided.

Higgins and Noonan<sup>1</sup> have reported 100 per cent of cures by the use of x ray. They state that only occasionally is it necessary to use a second

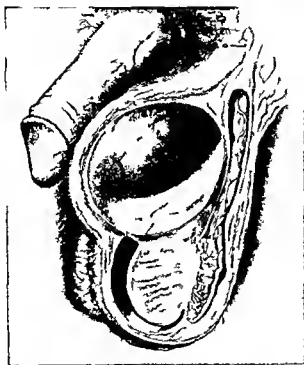


Fig 209 Large spermatocele (Herman The Practice of Urology W B Saunders Co Philadelphia)

treatment. Obviously such cures occur by virtue of the checking of spermatogenesis. The patient generates no more spermatozoa with which to fill the sac. The production of sterility naturally limits this form of treatment to those who have all the children they want or are well on in years. It does not render one impotent but it would be well to see that patients thoroughly understand things before subjecting them to the effort. As this looks like a fertile field for medicolegal annoyances it might not be amiss to have the patient sign a written agreement.

*Hematocoele*—Much confusion has existed as to the true nature of hematocoele by virtue of the fact that any bleeding into the scrotum whether it be in or around the tunica vaginalis testis or even in the testicle

was likely to be given that designation. True hematocele is bleeding into the tunica of either the testis or the cord. It may originate as the direct result of the bleeding but, generally, it is due to the escape of blood into a hydrocele already present and, usually, is the result of trauma.

Hematocele may form quickly after a scrotal injury causing a painful swelling of rapid development. Generally, however, the blood flows slowly into a hydrocele without any sudden increase of symptoms.

*Diagnosis.*—The diagnosis of hematocele is made by tapping, though it may be suspected because of the presence of an opaque swelling with all of the other characteristics of hydrocele. The character of the contained fluid varies with the time elapsing between the bleeding and the tapping. Early it is red, and then passes through the various color gradations until it becomes a dirty brown.

Great care should be taken to differentiate acute hematocele from incarcerated hernia. To fail to do so may cause dangerous delay of urgently needed surgery. To mistake any type of hernia for hematocele may bring grave misfortune and, certainly, no efforts at tapping should be made until hernia has been ruled out.

*Treatment.*—If the bleeding is not too great the treatment in acute hematocele should be palliative. Rest in bed, scrotal support and an ice-bag may be all that is needed to cause a subsidence of pain and a gradual reduction in the size of the mass. If this does not check conditions, the sac should be incised and drained. Where the hematocele has occurred in an old hydrocele it is best to resort to surgery.

*Malformation of the Testicles.*—In the development and descent of the testicle there are opportunities for the occurrence of several types of malformation ranging all the way from anorchism to polyorchism. There may be a seeming absence of any testicular tissue. However, it apparently is not proved that failure in genesis is complete except in monstrosities. Mistakes in this regard in the living are occasionally made, but there seem to be no autopsy data confirming complete testicular agenesis except as above mentioned.

The same condition apparently holds with development of a single testicle, monorchism, wherein the missing testicle almost invariably has failed to descend and has undergone an atrophic change. According to Hinman, however, there are two cases reported wherein there was complete absence of the seminal tract on one side.

Failure of the development of both testes, micro-orchism, is a far more common condition. In such cases the result is complete or partial eunuchism. Even more common is a lack of development of one testicle which has failed to descend. Quite a few cases of true supernumerary testicle have been reported and proved at either operation or autopsy. Most of the cases of supposed testicular duplication are in reality spermatoceles. Fusion of the testes with complete failure to descend has been known to occur.

*Inflammation of the Testicle.*—Modern diagnosis has shown that true orchitis is of rather infrequent occurrence compared with the former views upon the subject. Formerly, it was assumed that a gonococcal infection of these structures involved the testicle as well as the epididymis, and the term epididymo-orchitis still persists in this connection in some quarters. It is probable that neither gonorrhea nor the other bladder and lower-tract

infections that account for most cases of epididymitis ever involve the testicle. If they do, it is solely from interference with blood supply or blood return.

*Etiology*—Inflammations of the testicle other than tuberculosis and syphilis are almost solely confined to infections of a metastatic nature. Rolnick has shown that ascending infection along the epididymal tube from the lower extremity of the vas deferens is practically an impossibility.

The most usual cause of orchitis is mumps, but it may be a complication of almost any of the acute contagious diseases. The condition occasionally is due to such foci of infection as tonsillitis, dental abscess, gallbladder infections, osteomyelitis and the like.

*Pathology*—Apparently, the pathologic change in orchitis shows itself mostly outside the canaliculi (Girode). There is great swelling of the organ and usually some associated hydrocele. The epididymis, often, and the spermatic cord more rarely, share in the swelling. In the metastatic orchitis due to pyogenic organisms there may be multiple small foci of infection which later undergo resolution with their consequent contraction. On the other hand, the suppurative process may be much more massive, presenting fluctuation and other signs of the presence of pus in quantity. There may be complete destruction of the organ. More often, the late result is an atrophy.

*Symptoms*—As a rule, the onset of orchitis is characterized by great testicular pain, elevation of temperature and, not uncommonly, nausea or vomiting. The organ is swollen, excessively tender, and the scrotum usually becomes reddened. Later, the epididymis and spermatic cord may become swollen and tender. Hydrocele commonly forms early to fog diagnosis. Usually the patient is far more prostrated than is the case with most cases of acute epididymitis. The pain may be referred to the back, the perineum, or upward along the spermatic cord.

*Diagnosis*—Such a seizure, coming on during the course of an acute infectious disease, causes little, if any difficulty of diagnosis. It is in the absence of such diseases that the diagnosis between orchitis and epididymitis is not always so easily made. The obscuring hydrocele also may add difficulties. Hinman advises against tapping these hydroceles to render palpation possible, stating that it 'is not without risk of spreading infection.'

*Treatment*—The treatment of orchitis is one of "watchful waiting." The applications of scrotal support, heat or cold, together with what systemic medication may be indicated for pain, about comprise the list, unless suppuration or necrosis force one into surgical intervention. Here, drainage may be sufficient if the suppurative area is small. If it is large, orchidectomy is better. There is the possibility that sulfanilamide or one of its allied drugs might be quickly curative in some few cases.

*Syphilitic Orchitis*—Undoubtedly there are many cases of syphilitic orchitis that are never recognized as such. For a testicle may show luetic involvement without increase in size. In animal experimentation it is not infrequent to find the *treponema* in the testicle and bone marrow even before the chancre has developed. The usual time for clinical evidence of syphilitic involvement of the testis to appear is late after the chancre stage. Keyes cites 67 of his own cases wherein the earliest appearance was four months after the chancre and the latest, thirty-one years. Gummatous



orchitis, of course, comes only during the later stages of the disease. This, however, is not very definite, as some patients develop tertiary manifestations far earlier in point of time than do others.

*Pathology.*—When syphilis attacks the testicle it causes either an interstitial or a gummatous change in the organ. In the former, the most common form, the testis increases greatly in size by virtue of an increase of intercanalicular structure. There is an infiltration of plasma cells and lymphocytes between the tubules, particularly around the smaller blood vessels. If this does not go on to the formation of a gumma, the swelling gradually subsides and much fibrosis takes the place of the former cellular infiltration. The testicle may become much smaller than it formerly was, or it may resume its natural size, but it remains much more firm in consistency owing to the fibrous change alluded to.

Gummatous orchitis may start as an interstitial orchitis or as a gumma from its beginning. The enlargement may be nodular, involving only part of the organ or there may be more than one gumma. These undergo the caseous change common to gummata. They may break through the skin, leaving a discharging sinus or an area through which protrudes a fungating mass of granulation tissue. Occasionally there is an acute syphilitic orchitis which is more likely to be associated with a hydrocele of size.

*Symptoms.*—The slowly enlarging testicle gives no pain, in fact, it loses its normal sensitiveness and the seemingly uninvolved testis often is equally insensitive. The organ may reach several times its normal size. To palpation it is dense and strikingly heavy. So pronounced are these two features in most cases that the name "billiard-ball testicle" used to be applied to the condition.

If a gumma forms there usually is an irregularity to the organ and there may be some nodules in the globus minor of the epididymis.

*Diagnosis.*—Syphilitic involvement of the testicle should present little difficulty, as a rule. The slow-growing, painless, insensitive, heavy, smooth mass in the scrotum should suggest it and the Wassermann test should confirm it. The history usually develops a syphilitic infection with treatment of some sort. Where doubts exist the therapeutic test should answer the question.

Gummatous orchitis, particularly if there is epididymal nodulation, often is suggestive of tuberculous involvement, and the Wassermann test may be negative. It is therefore a good plan in all doubtful cases, wherein other urogenital tuberculosis is absent, to carry out a course of antisyphilitic treatment before dismissing syphilis from consideration.

The differentiation between luetic orchitis and malignancy must be considered and, if treatment does not cause rapid decrease in size of the organ, it may be wiser to do an orchidectomy than to temporize, as one can have both syphilis and teratoma testis.

*Treatment.*—The treatment is entirely that of systemic syphilis. As a rule, the swelling very quickly subsides and conditions become seemingly normal. Later, there may be a testicular atrophy, or the organ may remain firm in consistency. The hydrocele, if present, usually disappears with the subsidence of the swelling. No local treatment is needed except what may be necessary in the rare case of a broken-down gumma that has found its way to the scrotal surface.

**Neuralgia of the Testicle**—Modern diagnostic methods have almost obliterated the symptom complex that usually was covered by the above title. Apparently there is such a thing as neuralgia of the testis, but it must be extremely rare. Most persistent pains in an otherwise normal testicle are referred from other structures such as the ureter or seminal vesicle. Pain along the spermatic cord and into the testicle is by no means rare in incipient hernia particularly after prolonged physical exertion. Such patients do not of necessity have a true rupture. A large internal ring is all that is necessary.

**Etiology**—Little is really known of the cause of true testicular neuralgia. Careful study of supposed cases usually shows a relaxed internal inguinal ring with definite impulse on coughing, stone in the ureter, pathology in the seminal vesicle or adhesions of the tunica vaginalis as the result of a past inflammation. A good share of individuals who complain of testicular pain or ache, in the absence of obvious pathology, are of neurotic temperament. When, or if, that pain is relieved by treatment or suggestion they are very likely to develop pain elsewhere. Some of these, as the result of the testicular ache that is so common after prolonged ungratified sexual excitement develop a conviction that something is radically wrong with the organs. Thus is started a vicious cycle that requires much psychotherapy for its eradication.

**Treatment**—If careful search for a distant cause and its removal or much psychotherapy make no change in symptoms, it is justifiable to resort to surgery in those who give a history of previous inflammatory hydrocele. For not a few cases have been reported relieved of their pain by the breaking up of adhesions of the tunica vaginalis. It is possible that some cases were relieved by the psychic impression born of the conviction that at last, a reason had been found and removed. Even that is justifiable. Orchidectomy used to be advised in persistent cases, but one should consider matters for some time before resorting to such radical measures.

Before resorting to surgical measures in any patient who does not present a definite indication for them, it is well to try pressure at the corresponding inguinal ring. Often this is all that is needed to relieve the symptom. Such pressure can be made by a regular hernia truss or it can be done far more easily and cheaply by a slight addition to a jock strap. In order to do this a triangular piece of firm material is sewed to the belt strap and the descending portion in such a way that its free edge lies on the line of Poupart's ligament. On the inner side of this is sewed a large padded button in such a position that it overlies the internal abdominal ring.

**Testicular Injury**—Injuries to the testicle may be either bruising or lacerating in type. The first causes extravasation of blood into the testicle and the second, through a break in the fibrous coating, may allow the testicular substance to escape until the capsule is empty.

Contusions of the testicle may be caused by any force that catches the organ between it and a resistant portion of the body or other object. Lacerations are caused by sharp bodies, bullets or shell fragments.

**Symptoms**—Injuries of any type to the testicle cause pain, often out of proportion to the extent of the testicular change. There commonly is nausea and mild shock. Cases of death have been reported from the shock of testicular injury.

*Pathology.*—In contusion of the organ there may be a limited or extensive intracapsular hemorrhage causing much tension and varying amounts of destruction of testicular structure.

Lacerations, even though they seemingly do not injure much testicular structure may allow it to escape through the rent. Both types of injury may cause later testicular atrophy. Singularly enough, this may follow even slight contusions. Hence, one should be guarded in his predictions of just what the outcome will be so far as the testicle is concerned.

*Treatment.*—The treatment of testicular contusions comprises rest in bed, support and ice-bags early with, possibly, heat later. In the presence of laceration to the fibrous covering, an immediate surgical repair is indicated. Keyes warns against pulling out the yellow testicular substance under the

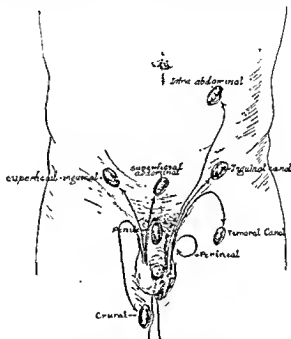


Fig. 210.—Possible positions of ectopic testes. (After Alyea.)

impression that it is sloughed tissue, as has been done on some occasions. The most meticulous asepsis should be maintained.

*Luxation of the Testicle.*—This unusual accident occurs as the result of violent pressure upon the scrotum. By such a force the testicle may be driven into the side of the penis, suprapubic region, inguinal canal, abdomen, or perineum. There is little difficulty in making the diagnosis, as the organ readily can be palpated in its new location.

*Treatment.*—The treatment of testicular luxation should be, first, a gentle effort to cause the organ to return to its normal location. Under general anesthesia this may be possible. If it is not possible, cold should be applied in the hope that a reduction in inflammatory reaction may allow the testicle to return to the scrotum, as occasionally happens.

If manipulative or other nonsurgical measures fail, surgery should be resorted to, as it has been shown that such a malposed testicle rather quickly

undergoes atrophy. If there is the slightest suggestion that testicular circulation has been interfered with, immediate resort to surgical interference should be had.

**Torsion of the Testicle**—Though torsion of the testicle may occur at almost any age it is far more common between puberty and the twenty-fifth year. This rotation of the testicle on its long axis may be of several grades, varying from a half turn to three or four turns. There is always a partial or complete strangulation of blood supply. If not relieved promptly testicular infarcts may occur which may go on to suppuration or gangrene. In the minor grades of torsion the organ undergoes atrophy if the torsion is not corrected.

**Etiology**—Torsion rarely occurs in a normally placed organ with normal scrotal attachments. Primarily it is due to some anatomic fault furnishing



Fig. 211 Complete turns in the spermatic cord due to torsion of the testis

the possibility of great testicular mobility. About half of the cases of torsion occur in persons with undescended testicles.

**Symptoms**—The occurrence is characterized by acute testicular pain, swelling and tenderness. Not only is there swelling in the testicle but the corresponding side of the scrotum usually becomes red and edematous. Varying degrees of shock with nausea and vomiting are the rule.

**Diagnosis**—The diagnosis of testicular torsion is not always a simple matter. Occurring in an undescended testicle it is likely to be confused with strangulated hernia. Under such circumstances its greater mobility, over that of hernial strangulation is a point of value in differentiation. As both conditions call for immediate operative interference however, the diagnosis is readily made at operation.

Torsion of the normally placed testicle is likely to be confused with acute epididymitis. In torsion it is not possible to palpate the epididymis as is the case in epididymitis—the entire scrotal swelling is one regular mass. The absence of urethritis or other urogenital infection is a valuable point

in favor of torsion. While epididymitis is associated with much tenderness, as a rule, that of torsion is extreme.

*Treatment.*—In the presence of torsion of a descended testicle it occasionally is possible to carry out digital rotation. Particularly is this so if the case is seen very shortly after the torsion has occurred. Even under such circumstances later anchoring of the testicle by operative means should be urged to prevent recurrence. Efforts at reduction having failed, operation should be carried out at once. Whether or not orchidectomy should be done is a matter of surgical judgment based upon the conditions found at operation. Cases seen late may be treated expectantly, providing the swelling is receding. Under such circumstances testicular atrophy is almost sure to ensue. If palliative methods do not bring about prompt improvement, it is probable that orchidectomy should be carried out.

*Malignant Growths of the Testicle.*—Few urogenital maladies are of more danger to the patient's life than are malignant growths of the testicle. The diagnosis, or, at least, a probable diagnosis, usually is so easily made that it should be expected that the urologist would see such cases in their earliest stages. Such, however, is far from being the true state of affairs. Dean has pointed out that the correct diagnosis of teratoma testis is so rarely made that of 124 patients seen by him at the Memorial Hospital, only 11 were found free from local recurrence or metastasis on admission. This deplorable situation existed in spite of the fact that 70 per cent of these patients sought medical advice within the first six months of the disease.

*Pathology.*—Testicular structure is susceptible to the development of new growths of many varieties. These may occur at any age and, not infrequently, are preceded by testicular trauma. They may be of extremely slow, or almost fulminantly rapid growth. According to Ewing, "In the testis one encounters a wide variety of neoplasms, from the most undifferentiated, diffusely growing, highly malignant, round-cell tumors, up to fully adult and harmless tissues and organs, all of which appear to have one and the same origin, the slow or rapid unfolding of original potencies of sex cells. These facts seem to the writer (Ewing) wholly irreconcilable with any relation to an external parasite, but reveal in striking manner the most important of all facts about the origin of neoplasms, that embryonal cells possess more than any others do, the essential factors in the inception of tumors."

Ewing further states that, "The commonest tumor of the testis is an embryonal carcinoma, alveolar or diffuse, with polyhedral or rounded cells and often with lymphoid stroma." He, however, believes that all testicular malignancies are of a tridermal type (teratomatous). Different portions of the growth differ in character but upon close study the multiple type of the tumor may be demonstrated. Not all writers, however, are in agreement with this view and much confusion reigns in their varied classifications. Much of this disagreement evidently is due to the fact that many workers view only as true teratoma those in which tridermal evidences are the outstanding feature. Be this as it may, the fact remains that one is safest if he views every testicular new growth as malignant when he has proved by Wassermann test and antiluetic treatment that it is not syphilitic. Even in the presence of lues it should not be forgotten that that disease is no bar to malignancy.

In testicular neoplasm the epididymus usually is uninvolved, bilateral testicular involvement is extremely rare, and undescended testicles show a greater tendency to develop neoplasms than do those in the scrotum.

The speed of metastasis is an extremely variable quantity. Some growths of considerable duration show no evidence of it, while others early show marked lymph node involvement. These occur along the course of drainage of the region, into the retroperitoneal area along the vena cava and aorta, as well as into the mediastinum.

*Symptoms*—In the early stages pain and tenderness are rare, though in the more advanced stages they may be severe. The patient usually discovers an enlargement of the testicle, but, because of its painlessness and, often, the loss of normal testicular sensitiveness, he gets the idea that it is



Fig. 212—Malignant growth of the testicle replacing the entire testicular structure

of no moment. After some months the increase in size and weight of the organ causes him to seek advice. Or, after some slight testicular trauma, the rapidity of growth causes him alarm. Occasionally, a secondary infection occurs in which the inflammatory evidences overshadow the presence of the neoplasm. Hydrocele is by no means rare and adds to the apparent size.

In the presence of cryptorchidism, particularly if the testicle is in the inguinal canal, there may be much pain because of the mechanical bars to enlargement.

The commonly observed fungating testicular growth of past decades now is rarely seen in large cities, though it still occurs in some individuals remote from medical centers. Where it does occur the tendency is to view

it as a gummatous mass, rather than testicular malignancy. Being a late manifestation in neglected cases, there almost invariably is discoverable metastasis present.

*Diagnosis.*—The presence of any swelling of the scrotal contents calls for the most careful study. And one should overcome the natural tendency to view variations in the comparative sizes of the testes lightly. It is due to this unfortunate trend that so many of the cases escape diagnosis until late in the disease. Comparatively few things cause a definite testicular enlargement and, in the absence of acute inflammation, all of them are matters of much seriousness for the patient. The weight of the testicle, often the hardened consistency of it, should arouse suspicion of neoplasm. Nodulation is rare until the growth reaches great size, for, as a rule, the general shape of the organ is unchanged. Areas of softening may be present as the result of the softer type of cells in various portions of the tumor or focal necrosis.

Testicular tumor readily may be differentiated from hydrocele by transillumination, though a hydrocele may mask a testicular growth that is not discovered until the fluid is aspirated. Hematocele may offer some diagnostic difficulty, but the presence of fluctuation should be of aid. Syphilitic orchitis is far more difficult of diagnosis and, where the Wassermann test is not definitely positive, a short course of antiluetic treatment may answer the question. Too much time, however, should not be devoted to this effect before preoperative irradiation is commenced.

Tuberculous epididymo-orchitis may at times simulate testicular neoplasm. Usually, however, this disease attacks the epididymis in such a way as to leave little doubt, when syphilis has been ruled out. And the common association of prostatic or seminal vesicular involvement helps to prevent error.

The diagnosis of new growth in an intrapelvic testicle is accompanied by much difficulty. Often, it is not made until nerve involvement has produced persistent neuralgia, or until edema of the extremities calls attention to some intra-abdominal lesion and the absence of a testicle upon one side arouses suspicion. Under such circumstances metastatic involvement of postperitoneal lymph nodes frequently is so massive as to be palpated with ease.

Where doubts still exist regarding the nature of a testicular enlargement the study of the patient's urine for its content of the anterior pituitary-like hormone, prolan, very frequently will settle the matter. Indeed, it is a good plan to have this test done on even those patients whose growths occasion no doubts, for the patient whose growth causes such an excess in the output of prolan usually will have a similar increase of this substance if he later develops any metastatic involvements. Thus, the test not only is of great value in diagnosis but it may have an equal value in later prognosis.

It has been found that during the presence of the testicular growth there is, in all but a few cases, an increase of this gonadotropic substance in the urine. In the absence of metastases of size, the prolan test becomes negative in about two or three weeks after the removal of the testicle. If it later becomes persistently positive, there need be little doubt about the presence of metastatic recurrences. The test is similar to the Aschheim-Zondek test. It has a high value when positive but is not to be relied upon too implicitly

when negative, as there are some types of growth that generally fail to cause any increase of prolan in the urine. Fortunately, these are far in the minority.

*Prognosis*—While the use of irradiation as an adjunct to surgery has improved the prognosis very materially, it still is a fact that by far the large majority of patients with teratoma testis do not survive for more than a year or two after the diagnosis is made. Whatever improvement in outlook has occurred, is due to preoperative or postoperative irradiation or both.

Some tumors are far more radiosensitive than others, and it is upon this point that much of the prognosis hangs. The method and extent of the irradiation likewise has much to do with the patient's outlook, and many "five-year cures" already have been recorded.

As has been said, the newer biologic studies aimed at the determination of the quantity of the hormone prolan in the urine are of inestimable diagnostic value. A rise above 300 rat units seems to be reliable evidence of the presence of active metastasis somewhere in the body. Likewise, a steady reduction from a high prolan content in the urine, as the result of treatment, is equally safe evidence that the original growth and its metastases are undergoing destruction. Some workers with considerable experience are not in total agreement with these opinions. However, the determination of the prolan content of the urine by the Aschheim-Zondek test unquestionably is of definite value.

*Treatment*—In regard to the occurrence of malignant growths of the testicle much would be gained if every physician were aware of their deadly potentialities, to the extent that every increase in size of the testicle be viewed with the deepest concern. Far too many such patients are allowed to drift into conditions that offer little hope by an assumption on the part of the physician that, because the enlargement has been present for a considerable length of time, it must be benign. A fair proportion of such growths show a long, symptomless period only to take on sudden increase in size. In most cases metastasis is present early, and it should be searched for always in the presence of any type of testicular enlargement.

*So far as irradiation is concerned, there is one group of workers that insists that it should precede operation and another that views it as belonging more appropriately to the postoperative period.* Pendergrass is particularly insistent upon thorough preoperative irradiation, he begins at the neck and works toward the genitalia. His reason for this is based upon the experimental work of Russ and Scott that shows rather conclusively that malignant growths in mice rarely, if ever, extend into tissue that previously has been irradiated. Seemingly, such irradiation renders tissue less hospitable to cancer cells. Thus, not only is present metastasis treated early after diagnosis but, at least theoretically, the operative hazards of distant cell implantation are reduced. Also, the radiosensitive portions of the testicular growth are equally influenced. He also believes that postoperative irradiation at its proper interval should be given.

Those who favor only postoperative irradiation seem to offer no very impressive reasons why it is the better procedure. And, considering that those who advise the former method also believe in giving the most careful attention to the postoperative period as well, it would seem to offer a



greater margin of safety for the patient. Prolan estimations should occupy an important place in future studies.

**Torsion of the Appendix Testis.**—This condition, while by no means common, occurs far more frequently before than after puberty. Its etiology is unknown. There is a complete rotation of body of the appendix testis on its cord-like attachment. Usually this is sufficient to interfere with or completely stop circulation. In the latter event gangrene of this structure takes place.

**Symptoms.**—The onset of symptoms is usually sudden. There is severe pain in the testicular region, great tenderness, swelling, and commonly some reddening of the scrotum. In children there may be a rise in temperature, a chill, and some gastro-intestinal disturbance. Often the symptoms suggest epididymitis or torsion of the testis, with which lesions it

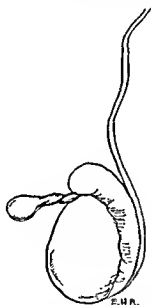


Fig. 213.—Torsion of the appendix testis.

commonly is confused. In some the torsion is relieved spontaneously only to return at some later time.

The pain may be confined to the scrotal contents, or be referred to the lower abdomen or down the thighs. It usually is severe in character, rendering the patient unable to get about. There is marked tenderness on palpation.

**Diagnosis.**—The diagnosis usually is made by ruling out epididymitis, torsion of the testis, mumps, tuberculosis and other things and by the demonstration of an extremely sensitive body near the upper pole of the epididymis. This latter often cannot be done with any great degree of sureness until around the third or fourth day. Then it usually is a simple matter.

**Treatment.**—The treatment is the surgical removal of the structure. Some few patients whose torsion is spontaneously relieved may receive relief from the wearing of a suspensory but sooner or later another attack occurs. Palliative treatment is not curative.

**Sterility**—In the consideration of the question of sterility, one must include both parties concerned in the matter. For, due to the recent advances in our knowledge of the subject, there are many more things to be answered than formerly seemed to be the case. Previously, it was simply a matter of the demonstration that the male could emit motile spermatozoa, and that digital examination found nothing grossly abnormal in his partner's genital tract. We now know that there are many women whose genital secretions are decidedly hostile to the sperm of the partner, whose ova cannot reach the uterus because of some type of obstruction of the fallopian tubes not associated with changes discoverable by digital study, or whose ovaries are not a type that could discharge normal ova.

Fortunately for the female, the time has passed when, just because her partner has been proved to have a sufficient number of normal and motile spermatozoa in his ejaculate, she must have some pelvic operation, often blindly done in the hope that it is the one thing indicated. The Rubin test to demonstrate the patency of her fallopian tubes and the Huhner test to prove whether or not motile spermatozoa penetrate into her uterine cavity have changed all of this. Assuredly, these things should be carried out before she is subjected to any operation however minor in character to favor impregnation.

In the study of the male one not only is concerned with the presence or absence of motile sperms in the ejaculate, but if they are absent he is confronted with the possible reasons for such absence. And it is here that his field of investigation greatly broadens. If the spermatozoa are decreased greatly in numbers almost to the vanishing point he finds himself almost floundering in a sea of endocrine dreams. For, certainly there has been much dream structure used to fill in the gaps in our knowledge regarding the spermatogenic function particularly in the degree in which it depends upon the proper functional balance of the more distant interrelated endocrine structures. Seemingly we know that there is such a complex association but there still is a world of investigative work to be done before our knowledge has been reduced to a degree of sureness wherein we can say that spermatogenesis in a given patient is due to the faulty action of the thyroid adrenals thymus or other structures. In other words, if we endeavor to influence spermatogenesis by glandular therapy, we often are just as likely to do the wrong thing as the right, if indeed there often is a right thing to do in this direction. (See section on Endocrinology and Sexual Performance.)

The first consideration that presents itself to the urologist is a determination as to the presence of motile sperms in the ejaculate. Their presence or absence readily can be determined by a study of the seminal fluid under the high dry lens as previously has been said in the section on the study of seminal fluid. The mere discovery of amotile spermatozoa in a condom specimen is rarely an evidence of that extremely rare condition, necrospemia. For, as also has been pointed out, there are many individuals whose spermatozoa very quickly become inactive as the result of the adverse action of the chemicals in the rubber. This often takes place even if the condom has been washed most carefully, as can be shown by the digital expression of seminal fluid from the same individual whose condom specimen seemed almost positively to indicate a complete necrospemia. It

is by no means uncommon to encounter patients who, rather than be bothered with bringing in a condom specimen, offer to produce the desired specimen manually. In them, unless the vesicles have not been emptied for two or more weeks, one does not find a complete absence of motility more than once in a large number. Even in them, a study repeated within a few days practically always shows much motility. In this regard, the writer's observations certainly are not in consonance with those of other investigators, who make much of this phase of the matter.

Of late years much has been said regarding the number of spermatozoa per cubic millimeter that one must have in order to be a good procreating animal. McCombie and Saunders, as cited by Thomson-Walker, state that normal semen should contain about 100,000,000 per c.c. of semen and that a seminal fluid containing below 60,000,000 is unlikely to cause impregnation. It may be perfectly possible that this is so, but, when one considers that it takes one lone sperm to cause fertilization of an ovum, he is prone to suspect that there is a tendency toward the building up of an arithmetic spermatozoal science that puts such cases as the one cited by the writer in the previously mentioned section in a position of just being better marksmen. Sixty million spermatozoa per c.c. are a lot of spermatozoa as compared with the two found after a twenty minutes' search in a case cited elsewhere. Unquestionably there is more to the matter than just numbers, particularly where the numbers run into the millions or even the thousands.

Much, also, has been said about the supposed influence of prostatic infection as a cause of sterility. The frequency of prostatic infections during the age wherein most men father children is at least 35 per cent. Thus, if this is a factor, we should start with about that number of sterile marriages. The fact that one finds such an infection in a man who has produced no children hardly can be taken as a reason for such failure in view of the frequency of the condition and the further fact that hundreds of thousands of males procreate despite marked prostatic infection. The writer is thoroughly in accord with Keyes when he says, "I have never seen a case in which the vitality of the semen was proved to be interfered with by suppuration in the prostate or seminal vesicles. Many persons with chronic prostatitis and seminal vesiculitis have all the children they want."<sup>1</sup> Apparently, one can view such an influence largely as that of a rather common condition being used as an explanation for something due to a far more obscure cause.

Simmons, as cited by Keyes, states that 61 per cent of alcoholics are sterile. Assuredly, this will come as a surprise to those in general practice whose alcoholics generally have more children than they can pay the doctor for. While it is possible that certain "chemical toxins" may have a direct effect upon one's ability to procreate, those away from the specialties will find it hard to place alcohol in such a group.

There is much clinical reason to believe that prolonged, depressed physical states reduce the likelihood of the production of conception. For most physicians have seen such individuals who, though indulging in normal intercourse, seemingly were sterile, but were not so when health was restored to normal. Here, again, one finds a possible explanation other than

<sup>1</sup>Keyes, E. L.: *Urology*, D. Appleton-Century Co., 1928.

a reduction of spermatozoal vitality. Impregnation rarely occurs from semen that is retained for many days, as has been stated in the section entitled Seminal Fluid. Such individuals rarely indulge at frequent intervals. When health returns, sex desire returns with it, and, frequently these individuals exert themselves to catch up with their lost opportunities. Even those men of heavy business responsibilities whose only successful efforts occur after periods of rest and vacation may merit a like explanation.

Obviously, there has been brought into the question of male sterility many explanations that seldom explain. They have done much to take our minds away from the countless influences presented by the female that preclude or limit conception. And though in some few cases they may merit serious consideration they never should be allowed to occupy too much of the field of vision.

With total absence of spermatozoa one has two questions to answer, viz.

(a) Does the testicle generate spermatozoa?

(b) If so, where are the conducting structures blocked?

The first often can be answered only by aspiration of some testicular secretion from the epididymis, the testicular hilum or the testicle. Failure to find sperm in such aspirates, however, does not always mean that spermatozoa are not formed. The second is to be answered only by the most careful studies of the conducting structures by x ray after the injection of some nonirritating opaque fluid, a procedure not without danger.

It is not always safe to assume that sterility resulting from bilateral epididymitis is a permanent thing. The writer followed such a patient for a number of years without finding a single spermatozoid. Finally, one of his enamoreds became pregnant and it was then found that his ejaculate teemed with highly motile spermatozoa.

*Treatment*—Naturally, the treatment of sterility is that of its cause, if the cause can be determined. Having demonstrated that an individual produces motile spermatozoa in numbers, attention first should be directed toward his partner's reproductive organs and just what they do to his spermatozoa. If both are as they should be success often is to be had by reducing the intervals between efforts at impregnation.

Because of the possibility of some physical states playing a part in the reduction of spermatozoal vitality, the patient should be placed in as good health as possible. Obvious endocrine disturbances or vitamin A and E deficiencies should receive attention as should any local pathology. Rest in those whose seminal fluid may be changed by excessive sexual indulgences and a change of scene and rest for those overworked highly tense individuals whose efforts have proved unsuccessful, is good judgment.

So far as the various occlusions of the seminal tract are concerned, the operation of epididymovasostomy may be successful in those whose atresia is in the epididymis alone. For those whose obstructions are higher up in the tract surgery has mostly nothing to offer.

Cases are reported wherein fluid drawn from the testicle was successful in artificial impregnation. Just how much reliance one can place in such reports it is difficult to say. The writer had a woman patient who became pregnant immediately after ureteral dilatations upon two separate occasions. When she returned for a third series of treatments, however, she removed any idea that the dilatations played a part. Using these as a satisfying

explanation at home, she deliberately had accepted the services of a third party who was eminently more successful than had been the husband.

Just what the future holds for the stimulation of spermatogenesis in those with true aspermia by means of gonadotropic hormones and the increasing number of endocrine products, it is impossible to predict. From the vast amount of experimental work that is being done along these lines, it is probable that we shall not have long to wait for, at least, a part of the answer. So far the answer seems to be a negative one, as it is pointed out in the Chapter on Urologic Endocrinology.

Cryptorchidism.—See Chapter on Endocrines in Urology.

## CHAPTER XI

### DISEASES OF THE BLADDER AND URETER

#### DISEASES OF THE BLADDER

**Rupture of the Bladder**—In few things has the march of modern progress more thoroughly changed the etiologic factors underlying a lesion than is the case with rupture of the bladder. If we go back twenty-five years and analyze the causes of rupture as given by White and Martin we find that 80 per cent were due to straddle falls, 12 per cent to perineal blows, 4 per cent to being run over by vehicles, and 4 per cent had fallen against the pommel of a saddle. Coming up to our own times we find the picture greatly changed according to Peacock and Hain, as cited by R. C. Graves. In their study, 46.4 per cent were due to crushing injuries, 3.5 per cent to mechanical irritant, 7.1 per cent were the result of surgical accidents, 10.7 per cent due to blows, 17.8 per cent to straddle falls and 14.5 per cent to other falls. Of the so called industrial injuries 18 per cent were due to motor vehicles while 50 per cent of the nonindustrial injuries were due to automobile accidents.

In this change in etiology there is found an increasing importance in this most dangerous of conditions. No longer may we view vesical rupture as belonging in the domain of the grievously injured who immediately are conveyed to the hospital. For an unfortunate number of such cases have escaped detection because of what seemed to be a minor injury. The distended bladder, particularly if its walls be weakened by disease, may be ruptured by forces that leave no evidences of external violence. Upon rare occasions particularly in the intoxicated the grossly distended bladder may be ruptured by the increased intra abdominal pressure of muscular contraction. Thus it will be seen that in office practice one should be alert to the possibility of rupture of the bladder even in the absence of direct injury. Also the increasing number of cases of rupture following the lately introduced means for electric destruction of tissue within the posterior urethra and bladder makes it highly important that we thoroughly familiarize ourselves with even the minor suggestive symptoms, as well as with the positive and early diagnosis of this grave misfortune. In few conditions does the patient's chance of recovery depend so greatly upon early diagnosis and immediate surgical intervention.

In the presence of fracture of the bony pelvis we long have taken immediate steps to assure ourselves that there was or was not a vesical or urethral injury. Many deaths, however, are to be attributed to the fact that we have not maintained this same attitude toward abdominal injuries in general. We should do well to consider carefully such a possibility wherever the patient has been subjected to a fall, blow, or crushing injury to the abdomen, particularly if there is reason to believe that the bladder held any amount of urine at the time.

**Symptoms.**—Obviously, the immediate symptoms of vesical rupture will depend upon the size and location of the rupture as well as the amount of urine in the bladder when the injury occurred. In the presence of severe injury to the patient the subjective vesical symptoms may be overshadowed entirely by the general or abdominal symptoms. There may be shock, abdominal pain, which may localize in the vesical area, later abdominal distention—or none of these may be present. Urination may be impossible or there may be the ability to pass some urine, which usually is tinged with blood. If the tear is intraperitoneal there are symptoms of peritonitis within twenty-four hours but, even before this, there are definite signs of peritoneal irritation. The pulse rate rises and there usually is some leukocytosis. The arresting qualities of these later symptoms usually bear a direct relation to the character of the escaped urine. If this is infected the peritoneal symptoms commonly are fulminant, while in the absence of such infection they are of less rapid and striking development.

If the rupture be extraperitoneal, the early symptoms will depend largely upon whether or not the urine is infected at the time of escape, though seemingly uninfected urine later produces suppuration. Aside



Fig. 214.—Mechanism of vesical rupture. A, Common site of rupture when bladder is only partially filled. B, Common site of rupture when bladder is distended. (After Rouvillois and Ferron.) C, Directions taken by escaped urine. (After Stirling and Belt.)

from the early toxic symptoms induced by the escape of infected urine, there are the evidences of urinary infiltration. The direction taken by this infiltration is controlled chiefly by the fascial planes it penetrates. And, while the external genitalia, lower abdomen, and perineum more commonly are involved, the extravasation may pass behind the peritoneum of the posterior abdominal wall working upward toward the diaphragm. At times, it passes into the subcutaneous tissues of the thighs.

That such grave symptoms should be present in some patients, symptoms that spell either death or, at best, a prolonged painful struggle for life, gives an added value to the earliest search for the possibility of rupture in every case of injury, even in the absence of any urinary symptoms whatever. That rupture can occur without immediate local symptoms is amply attested by clinical experience, and it is far better to subject some patients to studies that prove negative than to avoid these studies in even one patient who has a ruptured bladder.

**Diagnosis.**—Except in cases that are associated with profound shock wherein, fortunately, there usually is less difficulty in making a diagnosis of vesical rupture, modern science has furnished us with a means of making

a positive diagnosis even in the absence of other suggestive symptoms. The intravenous injection of either of the substances now generally employed for intravenous urography almost invariably will make it possible to obtain roentgenograms that reveal the fact that there is a rupture of the bladder as well as the course taken by the escaping urine. Even in the presence of moderate grades of shock there may be sufficient renal function to make this procedure possible and it should be employed whenever the least doubt exists regarding a solution of continuity of the bladder wall. Fortified with such a picture the surgeon is in an ideal position to interfere with far better judgment than otherwise holds.

While most ruptured bladders are empty when seen by the physician it should not be forgotten that this is largely dependent upon the size and position of the rent in the bladder wall. Thus the fact that urine can be passed by the patient or can be obtained through a catheter is in no sense proof that the bladder wall is intact. The presence of even the slightest amount of blood in the urine is ample reason for the application of roentgenographic studies in the entire absence of other symptoms. Vesical rupture is not always attended with marked bleeding and to take a complacent view of small amounts of blood in the urine may be to subject the patient to grave risks.

The aseptic catheterization of every patient who has had a fall or an abdominal injury unless the bladder is demonstrably distended particularly if the patient was intoxicated at the time and a careful study of the urine obtained may be definitely life saving measures. Where doubt exists exploratory operation is justifiable.

*Treatment*—The treatment of vesical rupture is invariably surgical and the results of surgical intervention are controlled so largely by the time elapsing between it and the injury as to give the utmost value to the earliest possible diagnosis. It is only thus that such lives are to be saved. Nowhere in the picture is there room for procrastination and palliative measures usually are little short of criminal.

*Tuberculosis of the Bladder*—Tuberculous involvement of the urinary bladder is almost invariably secondary to renal tuberculosis. Upon the rarest of occasions it may be secondary to prostatic or seminal vesicular involvement. Under its appropriate heading it has been considered in the section on cystoscopy and from a symptomatic standpoint it has been described as one of the presenting symptoms of renal infection by the tubercle bacillus. It is further discussed here as an appropriate place to speak of its treatment prior to nephrectomy after nephrectomy where vesical symptoms persist and in those patients who for one reason or another should not be operated upon.

To one who has seen many cases of renal tuberculosis with secondary bladder involvement and has watched the long uncomfortable convalescence from nephrectomy that is so common to them there is sure to come the conviction that much of it might be avoided if a little preoperative treatment were carried out. A majority of the candidates for nephrectomy are in a state of rather marled physical exhaustion just plain tired. The reason for much of it is obvious when a history is obtained of an atrociously frequent and painful urination which has not permitted of good refreshing sleep for weeks or months. What little sleep was gotten was of a fitful



troubled variety or was induced by morphine. Under such circumstances it is natural that a patient's recuperative powers should be at a low ebb.

*Treatment.*—It has been the writer's custom with such patients, to advise a course of preoperative treatment in an effort to give the patient sufficient relief to increase his restful sleep without opiates. By so doing he has seen a number of patients put in such an improved physical and mental shape as to make nephrectomy a much less serious thing and to favor a much shorter convalescence.

Because of the intolerance of most tuberculous bladders to the usual forms of intravesical irrigations, such treatments practically have been abandoned. Even 1:20,000 bichloride of mercury solution, which long enjoyed a reputation of favorable effect, though few have seen it produce such benefit, has virtually been discarded. This may be in a measure because of the practical impossibility of giving hydrostatic irrigations to such patients, together with the fact that the passage of catheters for bladder washing caused more trouble than the wash overcame.

No plan of treatment of these bladders that requires repeated intra-urethral or intravesical instrumentation will do as much good as harm.



Fig. 215.—Tuberculous granuloma and four typical vesical tubercles.

Therefore, if one is to medicate such a bladder he should do so by injecting the medicament into the bladder by means of a glass syringe with a rubber bulb ejector, he should do it gently and he should not inject more than 1 ounce of the chosen substance.

For such treatments the writer has used 10 per cent oil of gomenol daily or every other day with good success in a few cases. He has gotten far greater relief from 3 per cent liquid guaiacol in olive oil or from the same substance to which 5 per cent powdered calomel has been added.

Some of the most striking results that he has obtained were from the intravenous administration of 0.3 gram neoarsphenamine once a week. And there seldom is any real reason why the two plans may not be used concurrently.

Recalling an experience of a number of years ago, it is his belief that we lost something by allowing 20 per cent collargol to go into the urologic discard. In the days when collargol was used as a pyelographic medium a patient experienced so much relief from the procedure that he refused operation and insisted upon having the kidney pelvis washed out with collargol. This was done weekly through a bladder that was markedly

tuberculous but singularly tolerant to instrumentation. To the surprise of all of those interested in the case the patient became perfectly comfortable and the bladder was free from evidences of disease at the sixth treatment. Later the patient because of backache at his work submitted to the removal of a completely destroyed tuberculous kidney. If one may reason from this case it is possible that 10 per cent collargol might be used in the



Fig. 216. Marked tuberculous destruction of the kidney with secondary ureteral and vesical involvement. (Department of Pathology, University of Pennsylvania.)

bladder to the benefit of some few patients. It is possible, however, that 5 per cent would be better borne as one can inject into a kidney pelvis solutions of a strength that if placed directly in the bladder would cause much irritation.

**Diverticulum of the Bladder**—A diverticulum of the bladder is caused by the pushing outward of the bladder wall at some point so that there is

formed a new cavity that communicates with the bladder by means of an opening generally much smaller in diameter than the newly made bladder hernia. As a rule, this herniation occurs just above the ureteral orifices. Why this is so can be readily seen by holding a dissected bladder up to a light bulb. For above each ureteral orifice there is quite an area rather poorly supplied with muscle tissue. Occasionally, diverticular openings are found at other portions of the bladder. Some are on the lateral and posterior walls and, occasionally, they occur at the attachment of the urachus with the bladder.

*Etiology.*—While of late years there has been much talk about the possibility of true congenital diverticula, their scarcity in early life shows



Fig. 217.—A, A large vesical diverticulum with its opening on the vesical wall. B, The cystogram. (Herman, *The Practice of Urology*, W. B. Saunders Co., Philadelphia.)

that such an etiology must be unusual, if it ever is true. It is rather general clinical belief that true diverticulation is a back-pressure phenomenon. The more closely one studies the urinary habits of patients, as well as the minor and major conditions causing obstruction at or distal to the vesical outlet, the surer is he to believe that diverticulum is almost invariably an acquired condition. It is not really necessary to have a true obstructive condition in the lower urinary tract to cause a vesical diverticulum, though such an obstruction usually precedes the development of this vesical deformity. As has been noted elsewhere, the habit of straining at urination is by no means uncommon. The writer has seen a number of cases of vesical trabeculation and cellulation due solely to this habit. He also has seen two patients who presented no urinary obstruction and whose diverticula unquestionably

were due to almost a life long habit of forcing urination rather than waiting for normal sphincteric relaxation

The most common obstructive lesions predisposing to diverticulum of course are prostatic hypertrophy vesical outlet fibrosis (median bar) and urethral stricture Pin point urinary meatus in infancy may have a like influence Congenital valves of the urethra for some unknown reason more commonly exert their dilating influences on the ureters and kidney pelves

*Symptoms*—Diverticula of the bladder commonly reach enormous size before they produce any symptoms In fact they usually are discovered in our studies for the causes of lower tract obstruction At times the patient has what our forefathers called the flush tank symptom and which



Fig 218 Cystogram showing two diverticula of the bladder of about equal size of the true cavity (Department of Roentgenology University of Pennsylvania)

they usually erroneously attributed to hydronephrosis This symptom manifests itself in the fact that the patient having just emptied a large amount of urine from his bladder can repeat the procedure in a very few moments This peculiarity however is not necessarily of diagnostic significance as many nervous patients free from urogenital pathology can do the same thing

Infection of bladders having diverticula are quite common and are exceedingly difficult to clear up Many such cases of pyuria continue until the diverticulum is removed as well as the obstruction that caused it As the diverticular wall is quite thin it is common for a peridiverticulitis to occur as the result of which the sac becomes attached to the extravescical structures The inclusion of a vesical diverticulum in a hernial sac has been reported a number of times

*Diagnosis.*—The discovery of the existence of one or more diverticula is generally not made until a cystoscopy or an x-ray study with some opaque medium in the bladder is carried out for the determination of the cause of symptoms supposed to be due to other things. In other words, the presence of a diverticulum is usually an accidental find. At cystoscopy one sees one or more openings passing through the bladder wall. At least, he should see them but the best cystoscopists at times fail to discover them. Such failure usually is due to the presence of an intolerant bladder that does not permit of satisfactory dilatation for good visualization of its entire wall.

The size, location and number of such diverticula usually can be demonstrated by cystograms made from various angles with the bladder full of a radiographic solution.

*Treatment.*—In the treatment of vesical diverticula one must be guided by a number of considerations which differ widely in different patients. In any case, the first consideration is the removal of the cause. If this requires opening the bladder, and the patient is in fit condition for removal of his diverticulum, it is a proper procedure, particularly if there is urinary infection and the diverticulum does not empty.

If, on the other hand, the obstructive condition be of the nature of a stricture or a median bar, it is well to relieve it by intraurethral procedures, and leave the diverticulum for later consideration.

Diverticula that empty, often need no special operative treatment after the causative obstruction is removed. The same is true of those due to straining at urination, if they empty at urination. As a matter of fact, diverticulectomy frequently is so formidable a surgical procedure that the patient may fare better without it. Most urologists have known such patients to live for years in both health and comfort without surgical intervention. Most diverticula have been present for years before the diagnosis is made and there is little need for panic as a rule when they are discovered. They rarely are emergency matters.

In younger patients, who more often are better surgical risks, efforts toward the operative removal of diverticula more often are indicated. This is particularly the case where marked pyuria is a symptom.

Perhaps the strongest indications for surgical removal of the diverticulum are the following:

1. New growth of any type in its cavity.
2. The presence of a stone in it.
3. Intractable infection that persists after the removal of the obstructive cause of the diverticulum, where the patient is markedly influenced by toxic absorption or the associated vesical intolerance to fluids.
4. Interference with ureteral emptying due to compression by the diverticulum.
5. The facts that the bladder must be opened for other causes and that the diverticulum lends itself to safe removal.

*Vesical Calculus.*—Until more is known about the biochemical factors that determine the formation of urinary calculi one finds definite limitations facing him when he tries to discuss their etiology. Just why one patient develops a stone, while others with seemingly identical sets of con-

ditions fail to form them is not safely answerable in the present state of our knowledge. Though we may talk of changes in the colloidal balance of the urine, we still do not uncover the true underlying factors. There are so many contradictory things in our present conceptions of the processes at play that a recital of them gets us little beyond a skein of theories.

If one based his opinion upon the most common experiences on the Atlantic coast he would conclude that stasis of urine was a thing of prime necessity for vesical stone formation. For most of our cases of vesical stone can be demonstrated to have some conditions in the bladder favoring such stasis.

On the other hand if one were in India or Egypt his etiologic reasoning would be swayed toward urinary concentration, water salts, diet and like factors. If in France and Italy, he would think of wine drinking. Or, if he based his ideas upon recent animal experimentation, he would be tempted to narrow them down to vitamin deficiency of some type as a primary factor in stone formation with perhaps infection as one of secondary importance. Obviously, there are many things that have to do with vesical stone formation and they probably differ greatly in different patients. Inasmuch as the subject of renal stone has been discussed elsewhere together with the recent findings of Randall, there is little point in prolonged etiologic discussion here.

**Symptoms**—The symptoms of stone in the bladder vary from none at all to some of the most annoying and painful experiences known to man. They vary with individual temperament, size and type of stone, and with the associated pathology. Largely, they are of mechanical origin and their severity commonly is governed by the size, contour and positions of the stone. Stones that for one reason or another do not touch the trigone or get within the grasp of the vesical outlet, seldom cause much agony to the patient, unless they do so by setting up a violent cystitis through trauma and infection, which cystitis spreads to the trigone and vesical outlet.

It is because calculi are more likely to rest on the trigone when the patient is in an upright position that they are more prone to produce symptoms during the day. On the other hand those that rest on the bladder base without touching this structure are more likely to be what we call 'silent stones'. Often they produce no symptoms whatever and are found during studies for other conditions.

Stones that rest, or can move so that they obstruct the vesical outlet when the bladder is partially empty, give the painful stoppage of the urinary stream so long considered pathognomonic of vesical stone. Foreign body or vesical tumor may do and, perhaps more commonly, does the same thing.

If the stone or any portion of it gets within the grasp of the vesical outlet, there often is added violent strangury and pain along the urethra particularly in the glans penis.

Most bladder stones occasion a macroscopic or a microscopic hematuria. This may be constant or intermittent. Also, it may not occur at all. Generally, there is an excess of both epithelial cells and leukocytes in the urine. If infection is present there usually is a marked pyuria. The urine may or may not contain crystals.

Frequency of urination and vesical discomfort are variable and depend on trigonal irritation or inflammation or upon an associated general cystitis.

Diurnal frequency is more common. In the absence of cystitis there may be no nocturnal frequency. In its presence, night-time may be the patient's most miserable period.

It, thus, can be seen that so few patients present the symptoms supposedly characteristic of vesical stone as to discount the real value of symptoms, except so far as they lead to further study, in the majority of patients. Rarely can one make a diagnosis from symptoms alone.

*Diagnosis.*—The diagnosis of stone in the bladder rests almost entirely in the studies suggested by symptoms. Of the methods of diagnosis the outstanding one is cystoscopy. Even x-ray takes a secondary place in these patients, for it is not uncommon for really large stones to escape observation by this method. The use of the old stone-searcher has largely been abandoned. Not only is it possible to fail to find the stone with it, but it is a really dangerous instrument. To pass it through the urethra without the danger of making a false passage requires considerable experience in urethral instrumentation. And one who has examined many bladders after a stone-searcher has been used will not think it devoid of danger to that viscus. Further, its supposedly positive findings are not always so reliable as they are supposed to be. Upon several occasions the writer has seen the tough fibrous trabecular bands so common in back-pressure bladders convince the examiner that there was a soft stone in the bladder.

*Treatment.*—As so much of the treatment of vesical stone has to do with cystoscopy the reader is referred to that section for a further consideration of it.

*Bladder Tumor.*—Tumors of the bladder are by no means as rare as their early diagnosis. When discovered they commonly are far advanced, a truth that depends in a large measure upon the overlooking of suggestive symptoms either by the patient or his physician. The far too common practice of quieting the mind regarding hematuria is a big factor in the advanced stage at which many such growths are discovered. There occur, also, a goodly proportion of patients in whom hematuria does not occur until the growth has reached marked proportions. Occurring, as this symptom does, in at least 75 per cent of the cases should be sufficient to direct attention to it as a symptom of far too serious import to be viewed lightly.

*Etiology.*—The true etiology of vesical neoplasms is not known. That long-standing irritation is a predisposing factor is shown by their frequency in the presence of vesical stone, chronic cystitis, diverticulum, leukoplakia, bilharziasis and in persons subjected to the excretion of fractions of coal tar. That these growths arise in many cases in the utter absence of any demonstrable irritation to the bladder or its mucous membrane, shows that prolonged irritation is by no means necessary in their causation. It also shows how incomplete is our knowledge of the factors determining the formation of both benign and malignant tumors in this region.

Of their nature otherwise, we have been able to accumulate much data of value. We know that either type of tumor may be primary or secondary, that it may form in the bladder alone, be implanted from a growth in the upper tract, or an extension from the prostate or some contiguous organ or structure.

There is much evidence that submucosal infiltrations causing changes in the bladder mucosa commonly undergo a malignant change, particularly if

the surface cells are subjected to constant irritation. We know that both benign and malignant tumors may cause what the English call *kiss tumors*—tumors occurring in normal surfaces lying in contact with tumors.

We know further that contact is not necessary for secondary tumors but that they may become engrafted upon surfaces remote from the initial tumor and that they may occur in the absence of instrumental or chemical mucosal abrasions but that they are more likely to occur if these are present. Also we have ample experience to show that even what we call benign tumors are potentially malignant—that if they are not entirely removed they are almost sure to undergo malignant change.

Thus it will be seen that our real ignorance lies in the field of etiology and our knowledge in the fields of biologic course and clinical probabilities. With truly malignant growths we have never boasted loudly of our ability to cure but with those of a benign nature though they be potentially malignant we have been highly successful.

In our use of the word *primary* in regard to vesical growths there has developed some confusion. Some clinicians restrict it to its true meaning of originating solely in the organ under discussion while others make it include those growths originating elsewhere in the body and later involving the urogenital tract. In other words they give it the meaning that always has been understood by the term *primary urogenital tuberculosis*. The writer favors the former as permitting of no confusion meaning just what it says. Thus when the bladder is under discussion a secondary bladder growth is one that begins in either some other portion of the tract or in some contiguous structure and secondarily involves the bladder.

So far as the urinary tract alone is concerned it perhaps does not occur that a bladder growth secondarily involves the kidney or its pelvis but it occasionally occurs that upper tract tumors become secondarily implanted in the bladder without involvement of the ureter. Bladder growths as secondary to lesions in the prostate and urethra practically always are by continuity of structure without intervening healthy tissue. It however is theoretically possible for urethral growths to cause bladder implants when small fragments enter the bladder cavity. Examples suggesting such a mode of bladder involvement are of the greatest rarity. Extensions of malignancy from the uterine cervix sigmoid and other contiguous structures are by no means rare.

*Classification of Tumors*—In points of tissue origin bladder tumors are mainly of three types namely epithelial mesothelial and heterotopic.

It is generally stated that 90 per cent of all bladder tumors spring from the epithelial lining. While the figures may be pathologically correct clinical experience would seem to indicate that the figure should be somewhere around 98 per cent for other tumors are encountered with the utmost rarity. Perhaps it is a coincidence which later years may reverse but in over twenty seven years of cystoscopy the writer has never encountered but one each of the two last types at least others have never been demonstrated pathologically as such.

Of the epithelial tumors papillomata comprise at least 50 per cent of those encountered cystoscopically and most of the remainder are carcinomata of one type or another. The usual types of carcinoma encountered are papillary infiltrating adenocarcinoma and epithelioma. The last is very



rare, as, also, are adenomata, cyclindrical-celled carcinomata and chorion-epitheliomata.

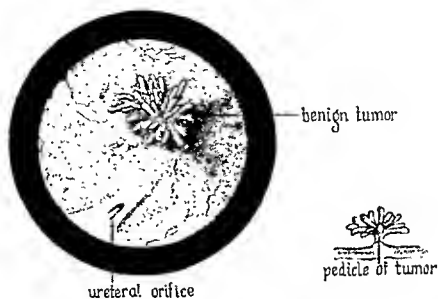


Fig. 219.—The common intravesical location and mode of bladder wall attachment of papilloma. (After Rathbun.)

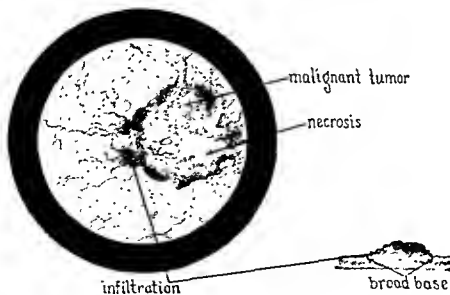


Fig. 220.—Vesical carcinoma and its broad base of attachment to the bladder wall, (After Rathbun.)

Of the mesothelial tumors sarcoma, fibroma, leiomyoma and rhabdomyoma have been encountered with great rarity.

Heterotopic tumors such as dermoids and teratoma are pathologic curiosities

From the standpoint of malignancy, much has been done of late years in the classification of bladder tumors. The work of Broders has been most generally accepted by urologists, and clinically his grades 1, 2, 3 and 4, although based upon a cellular interpretation, correspond respectively to papilloma, papilloma undergoing malignant change, papillary carcinoma and infiltrating carcinoma. And to the experienced cystoscopist it usually is a simple matter to differentiate these cystoscopically without resort to tissue sections. Despite this fact, biopsy for confirmation is highly important. Such a microscopic grading of tumors is of the utmost value in determining the prognosis of growths of a less typical cystoscopic character, and has added much to our knowledge of the subject.

**Symptoms**—It is an unfortunate circumstance that bladder neoplasms usually do not present symptoms during the earlier stages of their development. When such tumors are discovered in this stage it usually is during a study of symptoms not due to the growth. While the most common presenting symptom is bleeding, this rarely occurs with papilloma until the growth has reached a size that allows of its fimbriae being grasped by the bladder sphincter at the end of urination. Papillary carcinoma usually is of considerable size before macroscopic hematuria occurs, and infiltrating growths probably show a much later initial bleeding than do either. Consequently, though macroscopic bleeding occurs in at least 75 per cent of all bladder tumors it is likely to be rather a late symptom in many of them. The same is not so commonly true of microscopic blood, and this fact alone urges the value of the most exhaustive studies wherever an abnormal number of red blood cells is found at urinalysis. As has been said upon several occasions, blood in the urine so commonly indicates a lesion that, if left unattended, will cost the patient his health and often his life that it is a symptom of too great importance to be viewed lightly.

In at least 25 per cent of the cases of bladder neoplasm the initial symptoms are those of some type of bladder irritation or dysfunction. Many of these patients are conscious of some vesical discomfort. In some, there appear later the typical symptoms of cystitis—frequency, pyuria and, perhaps, tenesmus. There rather commonly is some interference with the ability to empty the bladder, occasionally there is true urinary retention. Such severe symptoms rarely occur without, at least, microscopic blood. In a fair proportion there is a terminal bleeding.

The severer bladder symptoms belong predominantly to malignant growths of the bladder, being rather rare in the presence of papillomata unless they have grown to enormous size or unless cystitis has been precipitated by instrumentation.

In the presence of malignant growths causing constriction around the ureteral orifices, the most pronounced initial symptoms may come from obstruction of that channel and be referred solely to the renal region.

With so grave a possible cause, it is obvious that considerable attention should be paid to all these symptoms. Any or all of them may be the sole things to suggest a lesion of the utmost gravity. Indeed, this is true of so many bladder symptoms that the urologists, who should be best at diagnosis

from symptoms alone, are the ones least willing to rely upon diagnoses thus based.

*Metastasis.*—Malignant growths of the bladder show a marked contrast to those of the prostate gland, so far as metastasis is concerned. For, while metastasis in prostatic carcinoma is rapid, that of vesical carcinoma is extremely slow, as a rule. In fact, Geraghty, as quoted by Hinman, was able to demonstrate metastasis only five times in twenty-seven patients dead of vesical carcinoma. Upon rare occasions, however, there is early blood stream metastasis. Lymphatic metastasis is extremely rare.

*Diagnosis.*—As safe diagnosis of any bladder tumor is dependent solely upon either cystographic or cystoscopic study, it will be considered under those headings in other sections of the book. Surely, one cannot make a symptomatic diagnosis of vesical tumor with any degree of sureness. The finding of the fat-like detached fimbriae in the voided urine may be moderately safe for the pronouncement of papilloma, but even this is not enough in view of the malignant potentialities of such growths.

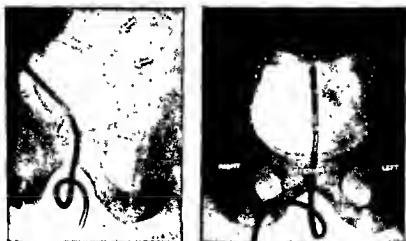


Fig. 221.—Aerocystograms showing the marked filling defects caused by large vesical tumors. (Courtesy of Dr. George Pfahler.)

*Treatment.*—The treatment of benign papilloma, or, if one clings to Broders' classification, grade 1 growth, is destruction by high-frequency fulguration. It should be kept constantly in mind that these growths show a marked tendency to recur, either at the original site or elsewhere in the bladder. Thus, a seeming cure is not to be trusted. The patient's bladder should be observed at least once a year for many years, if not for life. During the first year after the removal of a papilloma the bladder should be inspected at intervals of three months.

The treatment of vesical malignancy, until the last few years, has been almost as hopeless as is that of prostatic carcinoma. Operative intervention was successful on but the rarest of occasions. Deep surgical diathermy occasionally helped, but in most cases was a failure in that it added to the patient's discomfort without curing.

Of late years the proper use of radium seed implantations and deep x-ray therapy has shown much more curative effect. In not a few cases has

the growth disappeared though the time since its introduction is too short for a proper evaluation of it. Naturally, it meets with its best results in small growths and usually fails where there is extensive vesical involvement. Even here, however, the use of x ray alone frequently checks bleeding, reduces bladder symptoms and, often, seems to retard the rapidity of growth.

While advances have been made, vesical carcinoma remains one of urology's most disappointing chapters. There is reason to hope that, with improvement in technic and greater experience, this may not long be the case.

**Acute Retention of Urine**—Few human emergencies call for greater judgment and greater care in the method of their relief than does acute retention of urine. Its onset is so sudden and the distress it occasions is so great as to constitute one of the most dramatic of medical experiences. So insistent is the patient's call for immediate relief that it often has stampeded the physician into a haste that was not altogether best for the future outlook of the sufferer. Beyond a question, acute retention of urine is an extremely painful thing, but one who has observed many cases of acute retention is sure to sense that the mental panic of the patient greatly multiplies the appreciation of this pain. Indeed it usually is possible to greatly reduce the patient's suffering merely by convincing him of the fact that acute retention of urine, though painful, carries little danger to life itself.

One almost never sees so dramatic an outburst from a patient experiencing a second or third attack of acute retention as occurs upon the first attack. Knowledge of this is an important thing for the physician to have, for through allaying the patient's fears as to the dangers of the situation and perhaps relieving his pain, he can be more deliberate in his preparations for relief and avoid the blunders so common to haste. For acute retention may be due to such a multiplicity of causes, many of which require widely differing methods for relief, that the physician has more to think of than the mere act of emptying the bladder. Even were this the sole consideration, undue haste may be a definite menace to the patient's future, perhaps his life, and a knowledge of the cause of the retention is the physician's most valuable guide to the safest and best method for its relief.

In a consideration of the subject one must not lose sight of the true physiology of the act of urination and to what a marked extent it can be influenced by the patient's mental processes. Urination is largely an act of relaxation wherein is required not only a proper neuromuscular balance but also a proper frame of mind. Any interference with either can, and often does, interfere with the act. Even in health, the act can be made impossible by so small a thing as the mental conviction that it cannot be accomplished. And it is to be expected that mental inhibitions would play an important part in the establishment of acute retention in the presence of many types of lower urogenital disease which, in themselves, did not entirely obstruct the urinary passage. So true is this that one should endeavor to remove these mental inhibitions and try to establish voluntary urination by one means or another in many such patients before resorting to the more immediate, more dramatic but far more dangerous means of instrumental relief. Particularly is this true in the earlier years of life and in persons with neurotic tendencies, and it has almost an equal value in many older patients. Psychotherapy, pain relievers and the hot sitz bath may avoid much risk for the patient.

*Etiology.*—In regard to its causes, acute urinary retention may be divided primarily into two great groups, nonobstructive and obstructive. The former has to do entirely with changes in the neuromuscular balance of the urinary apparatus as the results of local or central interferences with the proper nervous impulses to the sphincteric muscles. And, as the vesical outlet sphincter is such a weak thing that a little intra-abdominal pressure will overcome it, the trouble lies mainly in the compressor urethrae, or cut-off muscle. The precipitating factor may be true pathology in the nervous system or it may be merely faulty cerebration. The normal function of these sphincters is tonic contraction until the cerebral or spinal centers bid them to open, and any interference with these impulses can give an attack of acute retention.

As it has been pointed out in several places, this function of opening the two sphincters is not altogether alike in both, for it has been shown that the vesical outlet opens by means of the contraction of muscle fibers running from the ureteral ridges of the verumontanum, and, perhaps, the action of the detrusor muscles, whereas the cut-off muscle seems to open by virtue of its complete relaxation. Unless this is borne in mind the function has elements of confusion, for in the retention of spinal cord disease we see relaxation of the vesical sphincter and spastic contraction of the cut-off muscle. As such retention occurs as the result of spinal irritation, it is probable that the vesical sphincter remains open early because these trigono-verumontanal muscle fibers also are in such spastic contraction that the true vesical sphincter cannot act. Later there may be a true palsy.

Obstructive retention obviously may result from a great number of urogenital conditions and may be precipitated, or maintained, as has been said, by neurogenic impulses or mental inhibitions. Though its obstructive features are of greatest importance, a knowledge of the others often is of great help.

Certain of the obstructive causes of acute retention belong preponderantly to certain stages of life. So true is this that it very commonly serves as a guide to treatment.

Retention in infancy occurs most commonly from an imperforate prepuce or external urinary meatus. The cause of it is obvious on the most casual inspection. Rarely, it is due to a congenital valve in the posterior urethra or a cyst of the sinus pocularis. With the most extreme rarity it is due to atresia of the urethra. True functional or nonobstructive retention is rare, if it ever occurs, in infancy.

In early childhood retention may occur as the result of febrile attacks, acute infectious diseases, local inflammation, spinal cord diseases or injuries, fecal impaction, injuries to the urethra, or mental inhibitions born of the fear of painful urination. At times, it may result from stone in the urethra or blood-clot in the bladder.

In adolescence we are more likely, particularly in the female, to encounter retention from neurotic causes. With the exception of the few cases due to injury, gonorrhea and its complications, urethral stricture, foreign body and prostatic abscess, obstructive retention in the male is rather uncommon during this period of life.

Early adult life shows the continuance of neurotic influences and gonorrhea as direct causes of retention. The greater frequency of urethral stric-

ture and prostatic abscess among the obstructive causes becomes evident. Stone, foreign body and blood clot occur with greater frequency as does local and spinal cord injury. Febrile diseases more commonly affect urinary function. Operations, fecal impactions and birth canal trauma occupy a larger part of the picture. Fibrous obstructions at the vesical outlet though they may occur at any age more commonly are factors in early adult life.

Later adult life sees the advent of new growths of one type or another. Stone, stricture, trauma, spinal cord lesions, blood clot, abscesses and the like still play their parts, but one sees a decided fading out of the psychic and neurotic factors as principal causes of retention though they may continue to play the part of the last straw. Upon rare occasions retention even in this period of life may be solely of psychic origin.

**Prognosis**—The prognosis of acute urinary retention depends entirely upon its cause, the condition of the patient and the care and judgment that have been used in its relief. If relieved early and with due precaution it should carry with it except in the highly debilitated and in the aged practically no mortality. In the presence of advanced renal or cardiac disease its relief never should be an office procedure if fatalities are to be avoided. The same may be said with more force of chronic urinary retention.

**Treatment**—With such a multiplicity of causes it is obvious that no blanket rule can be laid down regarding treatment. However certain rules can be made regarding its dangers that apply in a measure to all cases and other rules that have not such general application.

1 Before resorting to instrumental relief other less dangerous methods should be tried wherever possible.

2 In retention due purely to psychic causes a catheter should be the last thing resorted to. Psychotherapy and a hot sitz bath usually will suffice.

3 The same is true of the retention of acute gonorrhea in the absence of prostatic abscess.

4 In the retention of spinal cord injury the patient should be given an opportunity to establish an autonomic bladder and should be catheterized only when he has failed to do so perhaps not at all.

5 The urethra always contains bacteria and it should be thoroughly cleansed by some antiseptic before any instrument is passed through it.

6 A markedly distended bladder rarely should be completely emptied at once.

7 The older or weaker the individual the more slowly the bladder should be emptied.

8 The first two ounces drawn from the bladder in nephritic patients is the most dangerous portion. It should be done drop by drop or better, by a gradual decompression apparatus.

9 The younger and more robust the patient the less likelihood is there of intravesical hemorrhage.

10 Hemorrhage is common in the presence of great prostatic hypertrophy and malignant growth of the bladder.

11 No case requires more scrupulous asepsis than that of the individual with residual urine prior to his acute retention or that of the one whose retention is due to spinal cord injury.

12 It is best to leave a few ounces of some nonirritating antiseptic in

every bladder that has been relieved of acute retention by catheterization.

13. Even when only a portion of the urine is withdrawn at the first effort, it is well to inject an antiseptic into the remaining urine.

14. The instrument of first choice in any case of retention is a soft-rubber catheter—it produces least trauma.

15. The most dangerous instruments are the Gouley tunneled catheter and other small metal instruments.

16. The best single instrument for drop-by-drop decompression is the small ureteral catheter, though a filiform tied in the urethra gradually will bring about the same result.

17. The instrument of last resort is the overcurved metal catheter.

18. The procedures of last resort are suprapubic tapping with a trocar, and, in rare cases, cystotomy, except with the latter in the retention due to spinal injury.

19. If great difficulty has been experienced in getting any instrument into the bladder it should be left there unless it is a rigid one.

20. Retention from injuries, particularly if there is the slightest suggestion of urinary extravasation, requires immediate operation, and such patients are not office cases.

21. A careful inquiry into the previous history, careful prostatic palpation, the age of the patient, and good judgment on the part of the physician usually will indicate the instrument most appropriate for the given patient and nothing is more needful for success than the proper instrument.

The most common error in attempts at the relief of acute retention is the choice of an instrument thoroughly unsuited to the case in hand, and the most unfortunate phase of such efforts, aside from failure, is the trauma produced by the physician. One should not expect much from an instrument of large caliber in urethral stricture nor does he need one of small caliber in prostatic obstruction. But, in the selection of his instruments, age is not always the safest guide. Stricture belongs solely to no age, nor do prostatic obstructions. The point at which an instrument obstructs is the simplest answer to the type of instrument required. Strictures do not occur in the posterior urethra, for which reason, obstructions encountered anterior to the membranous urethra call for smaller instruments and those of the posterior urethra call for differently curved or angulated ones. The first is a question of diameter and the last is a question of direction, and careful attention to these will avoid both chagrin and danger.

A careful diagnosis of the cause of the retention; a realization of the dangers of trauma, infection, the shock or hemorrhage of too hasty relief; and a proper after-care of the patient, will do much to rob the condition of both its drama and danger. Judgment is required in a selection of those patients who need hospital care and those who safely can be relieved in the office. The cardiorenal patient travels on a thin margin of safety demanding every possible safeguard. An acute retention from blood-clot in the bladder may receive first relief as an office case but it rarely can be continued as such.

In the absence of a previous history of retention, which usually carries with it a diagnosis suggesting the type of instrument required for its relief, it is best to follow a rather definite routine in order to avoid undue trauma

or failure. The urethra should be cleansed carefully by a mild antiseptic wash such as 1:3000 acriflavine, 1:8000 potassium permanganate or saturated solution of boric acid. The largest flexible catheter that will pass comfortably through the external meatus should be lubricated well, and passed gently and slowly into the canal. If this instrument meets with obstruction anterior to the membranous urethra it indicates stricture and calls for a much smaller flexible catheter. Should this obstruct, the case probably is one of true urethral stricture and should be treated as has been advised under that heading.

Should the larger flexible catheter pass through the membranous urethra and then obstruct, there can be little question regarding a vesical outlet obstruction. Instruments appropriate to such obstructions then should be chosen and, as sudden decompression in prostatic obstructions usually is more hazardous than the other types, the catheter immediately should be plugged at its distal opening to avoid too sudden emptying of the bladder wherever there are indications urging slow emptying of the viscus. For the treatment of such cases the reader is referred to the section on Prostatic Hypertrophy.

Should the catheter enter the bladder and no urine come through it the bladder may be full of blood clot, the patient may be suffering from acute anuria and have no urine in his bladder, or he may have a ruptured bladder. To differentiate these conditions suction should be made on the catheter to see if blood clot comes through it. If it is a single eyed catheter great suction should not be applied. The emptying of bladders filled with blood clot is considered in the section on Cystoscopy.

In the female the common occurrence of acute urinary retention following operations and childbirth apparently often carries with it a much misunderstood aftermath. Moore<sup>1</sup> has called attention to the common occurrence of residual urine in patients after surgical operations and childbirth stating that this is the probable cause of cystitis and, perhaps later pyelitis, and not the use of the catheter alone, as it is commonly held. He cites Ruch as having demonstrated amounts of residual urine ranging from a few ounces to as much as 20 ounces in 90 per cent of fifty-eight postpartum patients. As the result of this observation he urges that a catheter be passed into the bladder daily until there no longer is residuum. Thus, according to Moore, it is the nonuse of the catheter and not the use of it that occasions the vesical infection.

It is probable that the injection of 5 per cent mild protein silver or some other mild antiseptic at the time of catheterization would do much for the patient's safety.

**The Neurogenic Bladder**—The term "neurogenic bladder" has gained common usage to designate those bladder changes and dysfunctions that occur primarily as a result of interferences with sensory, motor, or both, impulses from or to the cerebrospinal centers having to do with normal bladder function. It is, unquestionably, a better term than the even more commonly used one of "cord bladder," since it does not imply that the causal lesion is in the spinal cord alone. For it has been shown that changes in both the peripheral nerves and in the brain may produce symptoms and results practically analogous to those following changes in the cord alone.

<sup>1</sup> Moore, Thomas D. Urologists Correspondence Club Letter, August 25, 1939.



Of course, it is true that the vast majority of such causal lesions are in the spinal cord.

*Etiology.*—While the most common causes of the neurogenic bladder are tabes dorsalis and injuries to the spine, there is a large number of conditions that more rarely serve as causes. Of these the following are most worthy of mention: transverse myelitis, syringomyelia, multiple sclerosis, lumbar and spinal deformity (notably spina bifida), general paresis, primary lateral sclerosis, ataxic paraplegia, acute leptomeningitis, pernicious anemia, Addison's disease, arteriosclerosis of the cord, meningocele, malignancy, diabetes, gumma, hemorrhage of brain or cord, brain tumor and, rarely, lesions of the peripheral nerves of toxic origin.

The decidedly contradictory state of our knowledge regarding many of the underlying factors in bladder function leaves room for many doubts regarding the true mechanism of the changes and dysfunctions that we so readily recognize clinically. It, however, seems highly probable that the main cause rests in a sensory change in the bladder wall that interferes with conscious recognition of vesical distention. Thus, the stretch reaction is lost, or largely so; the primary urge to urination is obtunded or absent; and, though urination may occur at times as a voluntary act by virtue of remaining sphincteric control and contraction of the abdominal muscles, it not infrequently happens that there is at least sphincteric spasm, particularly in the early stages of slowly developing lesions of the cerebrospinal system, which further adds to the likelihood of vesical overdilatation. Further, overdilatation leads to poor muscle oxygenation which, in turn, hastens muscle atrophy.

The speed with which the vesical changes and the symptoms occurring from them take place largely is a matter of the suddenness of their cause. In the spinal injuries, hemorrhages and like precipitous things, they are rapid in appearance. In the more slowly developing things, such as tabes dorsalis, spastic paraplegia, pernicious anemia, and brain tumor, the vesical changes too are slow. Not infrequently, in these and like conditions, the stage of dilatation is preceded by a stage of spinal or cerebral irritation wherein the vesical condition is one of hyperfunction, as is shown by the cystometrograms taken at this time. Later, there is a loss of sensation, so that not only does the patient not realize that the bladder is full, but when he does void, he is likely to stop before the viscus is empty. Thus appears a stage wherein there is residual urine which gradually increases in quantity. The vesical outlet becomes flaccid and the posterior urethra virtually an offshoot of the bladder cavity. Finally, if the causal condition is not checked, the external vesical sphincter gives way and a state of complete urinary incontinence holds. Thus, the sequence of the cystometric readings would range through the various gradations between that of hypertonicity to that of no tonicity, depending upon the stage of the disease in which it is taken.

Though there is no question about the reduction and, often, the complete loss of sensation in the bladder wall, there is reason to question its always being of the depth that generally is assumed. Not a few workers have found that after intravesical pressure relief by either continued catheterization or suprapubic cystostomy, varying amounts of vesical sensibility return in many patients. In fact, there are case reports in which it has

returned sufficiently for the reestablishment of enough sensibility to give the patient moderately efficient bladder control. In such cases it is obvious that the deep anesthesia is a combination of both afferent nerve impulse interference and pressure anesthesia. Relief of pressure makes possible the regeneration of the latter; the former remains.

As a rule prior to the time of vesical outlet relaxation in these more slowly developing cases there is much difficulty in bringing about sphincteric relaxation. Even then it may not last during the entire time required to empty the bladder and the patient frequently finds it necessary to concentrate on relaxation to avoid sphincteric closure. When the internal vesical sphincter gives way the external sphincter still is spastic and responds slowly if at all to his mental urgings. Because of this the greatly distended viscus is caused by its increasing internal pressure to find relief which it does by the institution of what we call the overflow of retention.

The question as to whether the predominating influence is of sympathetic or parasympathetic origin is not always a simple one to answer owing to our contradictory data about both. It is outstanding that most of the experimental work indulged in to give us the answers we need has been concentrated upon the bladder trigone and vesical outlet. The equally important matter of the function of the external sphincter has been slighted to a large degree. This is rather surprising in view of the fact that it is the last thing to hold and it usually does this until long after the bladder trigone and vesical outlet virtually have ceased to be functioning structures and the posterior urethra has become practically a part of the bladder cavity.

There is much clinical reason to believe that the relaxation of the external sphincter is not so much a matter of conscious control as is that at the vesical outlet that it relaxes because of sensations applied to the mucous membrane of the posterior urethra. In nonprecipitous urination there is a definite interval of time between the escape of urine through the internal sphincter and the relaxation of this muscle. The urine can be felt to enter the posterior urethra and after a momentary hesitation it finds its way into the anterior urethra. Further one does not will to open his external sphincter at the moment of ejaculation and it is highly possible that this phenomenon is due to the presence of the initial part of the semen in the prostatic urethra. In interferences with local sensation in this portion of the canal the call for relaxation would be obtunded first and later lost. Thus there should be poor external sphincteric relaxation from its normal tonic state until such time as it too became completely paralyzed. And we should have just what we do have difficulty in starting the urinary stream in the early stages difficulty in maintaining relaxation of this sphincter long enough to empty the bladder (residual urine) inability to relax it as the urethral anesthesia increases (complete retention and later overflow of retention) and incontinence of urine after complete external sphincteric paralysis has taken place.

Thus it is obvious that there are many factors in the establishment of all of the stages of neurogenic dysfunction and that many of them are poorly understood. When it comes to the medical treatment of some of the minor changes in function there is excuse for much confusion. We have to do with both striated and nonstriated muscle fibers with general sympathetic and parasympathetic nerve action with the differing degrees of control of these structures in different individuals in both health and disease and with

mental attitude and a host of other things that make the clinical problem both confusing and interesting.

*Symptoms.*—As would be expected, the symptoms, their sequence and severity vary with the extent and suddenness of their causes. Following those of an immediate nature, stretch sense would be lost at once and there would ensue retention, usually painless, later an overflow of retention and, unless an autonomic function were established, there eventually would be complete incontinence. Some are of the opinion that, uninterfered with, automatic function would ensue in all cases. For instance, Wesson, as quoted by Munger, states that, "With a little morphine and patience they will all overflow and be converted into an automatic bladder in 96 hours." Whereas, Plaggenmeyer, as quoted by the same author, expresses the opinion that, "If the physician and patient will sufficiently persist, 75 per cent of the retention cases will so nearly approach the automatic bladder that a definite schedule of urination can be arranged entirely compatible with normal existence."

If infection of urine is present, or is precipitated by unwise treatment, as it so commonly is, there are added to the bladder symptoms those of upper tract infection because of patency of the ureteral orifices and, unless relief of pressure is secured and maintained, most of the patients die from this cause.

In those neurogenic disturbances of a more gradual nature, the symptoms are far slower in onset, as has been stated. Upon rare occasions, however, the first real symptom the patient has is a complete retention of urine.

Taking tabes as an example, as we well may, the most common sequence of events is about as follows: The patient notices that his stream is smaller and not so readily started. Often during the early irritative stage of the spinal lesion there is an initial stage of frequency and urgency of urination but, usually, even then, there is noticed a slowness in starting the stream. After this period of spinal stimulation it is rather common for the patient to find that, though the stream has started, it soon stops and that he may have to go through a mental resetting of the stage several times before the bladder is emptied to his satisfaction.

Later, as bladder anesthesia becomes more pronounced, he does not entirely empty his bladder, as that viscus either cannot function well on small amounts of urine or because the bladder is so insensitive that the patient assumes it is empty when it is not, residual urine begins to accumulate. Gradually this increases and he wets the bed from time to time. Later, the bladder becomes so greatly distended that an overflow of distention sets in and he thinks he cannot hold any urine, although his bladder is dilated enormously with it. Occasionally, bed-wetting or the overflow of retention are the first things he notices. If infection intervenes there are, of course, the symptoms due to that misfortune, which differ little, if at all, from those seen in other obstructive uropathies.

In the bladder dysfunctions associated with certain types of brain tumor, there frequently are longer stages of vesical hyperfunction than are common to those of other conditions. Frequently, during this stage there are either voluntary voidings or an urgency so great that the patient knows it is impossible to reach the urinal in time and does not try. As cited by

Watts and Uhle, this voluntary or careless urination may occur before the mental processes are greatly dulled.

Following this stage wherein the above mentioned workers always found cystometric readings denoting vesical hyperfunction, the readings gradually went over to those denoting hypofunction and the symptoms followed the same course as those previously described.

*Diagnosis*—The diagnosis of the neurogenic bladder disturbances following spinal injury, spinal hemorrhage and like things of sudden onset is seldom difficult. The patient either passes no urine or has an overflow of retention, and it usually is a simple matter to determine by palpation that the bladder is greatly distended.

The diagnosis of the more ingravescent types of dysfunction is not always a simple matter in their early stages. Though it is far from difficult as a rule, when the dysfunction has become well established. A carefully taken history may develop much that arouses suspicion and urologic and neurologic studies often answer the question. As has been cited in the section on cystoscopy, the bladder often shows signs of tabes before the neurologist is able to find truly confirmatory signs of that malady. Thus, if one would make his diagnoses early in this condition he must be ever on the alert for these early bladder changes that are of such a characteristic nature. And when he has found them, he does well not to be swayed too greatly by any amount of negative neurologic or serologic findings.

Before the stage of marked vesical distention cystometry is not to be relied upon too implicitly. Early, the readings may show hypertonicity. Following this may occur a prolonged period wherein the readings cling confusingly close to that midzone that we have called normal. Later, when there is least need for the cystometric readings, they definitely are of the hypotonic type.

*Treatment*—There are few things in which a greater percentage of patients have died directly as the result of ill advised treatment efforts than is the case with those sudden bladder dysfunctions so often occurring as the result of injuries to the spine. Probably nowhere in all of urology is the catheter such a deadly instrument as it is with these cases. Usually, he who resorts to intermittent catheterization of such patients could qualify well as a Lord High Executioner. No matter how careful his aseptic precautions may be, he is almost sure to lose most of his patients from urinary infection. Unquestionably, we well might place on the wall as the first call for the treatment of these patients the slogan, 'Spare the catheter and save the life.'

These patients do not die from urinary retention nor does the retention of itself permanently injure the urinary tract. They either establish an autonomic urination or they develop an overflow of retention which gives some relief. In other words urination is for them no immediate emergency. Its care is a matter of watchful waiting or the establishment of permanent drainage. The question whether to wait or not to wait, regarding this matter of permanent vesical drainage by a suprapubic opening is answered differently by men of vast experience in such cases. On the one hand, we find Wesson urging morphine and patience with the conviction that all of them will develop an autonomic function or Plaggemeyer only 75 per cent as optimistic. On the other hand, we find such men as Thomson-Walker, Kidd Edwin Davis Deming, Munger, and many others insist

ing upon immediate suprapubic drainage. One searches diligently, indeed, to find anyone advising an indwelling catheter.

In the slower developing cases, the preliminary treatment should be that of the cause. This is particularly true of tabes, wherein the progress of the bladder changes may be checked if treatment is started during the early stages. Indeed, it often is possible to bring about much improvement in function even in the later stages.

Where dysfunction has reached the point of small quantities of residual urine, stimulants to bladder contraction at times are of service. For this purpose Thomson-Walker advises 20 to 30 minims of the fluid extract of ergot, strychnine and the interrupted or galvanic electric current. Van Duzen recommends the choline derivatives, while Creevy favors pilocarpine and mecholy. Where the trigone is hyperfunctioning, belladonna seems to be the drug of choice.

In the presence of retention, large amounts of residual urine, or infection, intermittent catheterization is the method most commonly used. This should be done at regular intervals and the bladder washed with an efficient, nonirritating antiseptic solution. It is well to leave some of the fluid in the bladder after washing. In fact, the treatment is that appropriate to urinary obstructions due to other causes. Naturally, the most careful aseptic precautions are demanded and, if it is necessary that the patient do his own catheterizations, he should be instructed most carefully as to its dangers and how to minimize them.

Moderately large doses of methenamine should be given and the urine kept sufficiently acid to secure the antiseptic action of this drug in the urine. Keyes is of the opinion that methenamine is a specific for the tabetic bladder. It is possible that our further experiences with sulfonamides may prove them equally as efficient, particularly in those cases where methenamine fails.

In some few cases presacral neurectomy may be indicated and, occasionally, a permanent suprapubic drainage may give longer life with less danger and annoyance than will repeated catheterizations.

**Exstrophy of the Bladder.**—Exstrophy of the bladder is, perhaps, one of the most unfortunate of all of the malformations compatible with life. Due to the absence of the pubic arch and the abdominal wall over it, the posterior bladder wall and base protrude as a red, angry mucous membrane from which urine constantly oozes.

Exstrophy is about nine times as common in the male as in the female and is said to occur in about 1 of 45,000 human beings. It is associated with complete epispadias in both sexes and there commonly are other malformations. It is claimed that 50 per cent of the patients with exstrophy die in childhood and that only about 35 per cent live beyond twenty years of age. Death usually is due to renal infection.

The diagnosis is made at a glance, as no other human malady resembles it. The pouting, inflamed, often granular mucous membrane, the oozing urine and, at times, large or small plaques of calcareous deposit leave no doubt.

**Treatment.**—The treatment is either palliative or surgical. Keyes advises against operation until six to eight years, during which time some type of protecting urinal should be worn. The usual type of operation is the trans-

plantation of the ureters into the bowel. The operative and postoperative mortality is high. This however is gradually being reduced by better technic and it is probable that the outlook of such patients today is far better than was the case only a few years ago.



Fig. Cystrophy of the bladder in a boy fifteen months of age. (H. Man. Principles and Principles of Urology. W. B. Saunders Co. Philadelphia.)

#### DISEASES OF THE URETER

**Malformations of the Ureter**—The most common types of deviation from normal that occur in the ureter are the varying grades of *reduplication*. These take many forms some of which are seen by every cystoscopist of experience. It is by no means rare to discover two ureteral orifices on one or both sides nor is it uncommon to fail to see these supernumerary orifices when present. Such failure of discovery often leads to errors in diagnosis. A catheter passed into a different orifice at two separate cystoscopies may give very confusing findings. Once one has fallen victim to such errors he ever after is on the outlook for an extra orifice.

Though complete reduplication of ureters is the most usual form partial reduplication in which two channels from the kidney fuse before the bladder is reached is not altogether rare. The condition may be reversed in that the ureters leading from the two ureteral orifices fuse somewhere between the bladder and the kidney.

As a rule in complete reduplication the ureter leading from the ureteral orifice nearest the vesical outlet comes from the upper pole of the kidney. Upon rare occasions this is not so.

Many variations in the size, length and course of the ureter have been described the most disconcerting of which is that in which the ureter from

one kidney enters the bladder upon the opposite side. Fortunately, in these days of the frequent use of intravenous urography, this is not so likely to lead to needless and, perhaps, fatal surgery as was formerly the case.

In complete absence of a kidney there may be total absence of the ureter on that side or the ureter may be just a blind canal. The same occasionally is true of one of the two ureters on the same side.

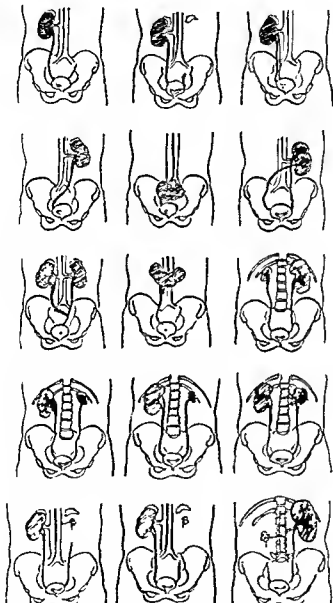


Fig. 223.—Outlines of various renal and ureteral anomalies. (After Gutierrez.)

Dilatation of the lower end of the ureter due to an abnormally small ureteral orifice occurs, and the dilatation frequently is not confined to the ureter alone but may be associated with some degree of dilatation of the kidney pelvis and, perhaps, the entire ureter. The ureter frequently pro-

jects prominently into the bladder as a large cystic body which may or may not collapse after each ureteral function. In some females the ureterocele has projected from the urethral orifice.

While the condition is far less common than ureteral reduplication it is by no means one of the rarities. Its symptoms and treatment are discussed in the section on cystoscopy.

*Misplaced Ureteral Orifice*—The ureteral orifice may be far from its normal location. It may be displaced forward, well up on the posterolateral wall, on the side opposite the kidney it drains, in the posterior urethra, the vagina, or introitus in the female. At times, such abnormally placed ureteral orifices are from one of a pair of reduplicated ureters.

*Abnormal Narrowings of the Ureter*—Congenital valves and, even strictures have been reported and they usually are associated with marked ureteral and pelvic dilatation. Most often these are discovered at autopsy in newborn children. Careful intravenous pyelographic studies, however usually will reveal the condition. Recently Vermooten has demonstrated in several children, partial obstruction with great dilatation of the ureters and kidney pelvis as the result of Chwalla's membrane, a veil of tissue occurring in the channel about where it emerges from the bladder wall. Occasionally there is a complete atresia of the canal. If it is unilateral, the child usually survives.

*Ureteral Calculus*—While stones rarely form primarily in the ureter the question of ureteral stones is of such great importance as to merit consideration separate from that of stone in the kidney. Although the stone almost invariably forms in the kidney pelvis, the symptoms caused by its passage through, or lodgment in the ureter are of such a distinctive nature that they have come to be viewed apart from their behavior in the kidney pelvis. Also, much confusion is to be avoided by their treatment as almost a separate clinical entity.

The use of the term 'renal colic' has been replaced largely by that of ureteral colic, and justly so, for it is rare for pelvic stones to produce colic. In fact, it is doubtful that they ever do. The pain of pelvic stone more often is a constant aching in the renal region, if it gives pain. It is only when the stone has become engaged in the ureteral lumen at or below the ureteropelvic junction that acute seizures of pain enter the clinical picture. And yet, it never should be lost sight of that stones in passage are not the only things that produce ureteral colic. The same symptoms may be caused by the passage of blood clot, sloughed tissue, urinary sand, echinococcus cysts or, in fact any particle that in any way can block the lumen and irritate the ureter. Even an inflamed appendix in close apposition to the ureter rather commonly causes mild symptoms highly suggestive of ureteral obstruction. More commonly, of course, a ureteral stone may simulate chronic or, even, acute appendicitis, and countless appendices have been removed needlessly for that reason.

The symptoms of the passage of a ureteral stone also may be produced by ureteral kink or stricture and they are extremely common after roughly or, at times, even gently performed ureteral catheterization.

*Symptoms*—While small smooth stones may pass from the kidney to the bladder without causing the patient any amount of distress, it is more usual for foreign bodies passing through the ureter to occasion great pain. Few



painful seizures are more characteristic than is frank ureteral colic, and few are more agonizing. Beginning when the stone engages at the ureteropelvic junction, they may continue until it passes into the bladder. More often the pain is less during the time the stone is passing through the more dilated portions of the tract. Of a terrifically lancinating character, these pains pass along the ureteral line into the testicle or labium of the same side, as the sex may be. At times, they pass down into the penis or to the inner side of the thigh. As the stone descends, it is common for the starting point of the pain to follow its descent.

Quiescent periods of hours, days or weeks may occur with the stone still in the ureteral lumen, so that a cessation of colic does not of necessity mean that the stone has reached the bladder.

If there is complete ureteral block, for a time there may be added the pain of distention of the renal pelvis, a pain starting in the renal region and

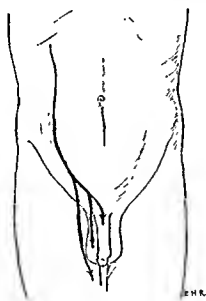


Fig. 224.—Diagram to show the most common directions of pain transference in ureteral colic.

passing forward. At times, the pain goes directly forward and, if on the right side, may raise the question of a possible biliary colic.

It is rather common for pain to be relieved when small or, at times, really large stones reach the pelvic ureter. And it is equally common for stones lodged in the intramural portion of the canal to fail to give true colicky pains. So located, they are likely to cause a frequency of urination more marked than that of a stone in the upper reaches of the canal. There may be testicular pain and retraction of the testicle as marked as that so commonly seen during the earlier stages of the stone's descent. The writer recalls one patient whose only symptom was constant pain in the testicle, with some retraction, for several years. Upon complete study he proved to have an enormous stone in his lower ureter. Above it was a functionless kidney.

Almost invariably, the urine shows either macroscopic or microscopic blood and albumin

During an acute ureteral colic the patient may be almost in a state of shock. There may be nausea and vomiting and, if infection is present, there is likely to be a chill with marked elevation of temperature if ureteral block is complete. In some cases, there is complete anuria.

*Diagnosis*—The diagnosis of severe ureteral colic may be made almost at a glance in most cases. The symptoms of the passage of a foreign body through the ureter are usually so characteristic that they seldom leave the

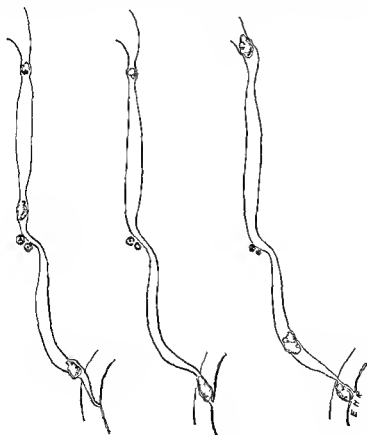


Fig. 725—The normal narrowings of the ureter and the common points of lodgment of calculi

physician in doubt regarding the treatment appropriate to the first few hours of the attack. The complete diagnosis, however, depends either upon recovery of the stone by its passage from the urethra or resort to the x ray and the cystoscope, and is further considered in the section on cystoscopy.

*Treatment*—The immediate call during the acute attack is for the relief of pain by the generous use of morphine hypodermatically and the application of heat. This latter may be done by hot towels, electric pad, hot-water bottle, or by wrapping the patient in hot blankets. If the pain subsides without the passage of the stone, the most careful x ray studies should be made and the question of whether or not the ureter is blocked should be

settled by cystoscopy. Grave renal damage may take place if this precaution is not followed. If pain continues for several days, the need for such diagnostic procedures is greatly enhanced. Continued elevation of temperature makes them almost imperative.

Should anuria supervene, immediate steps should be taken to secure ureteral drainage and, if this cannot be done by means of the ureteral catheter, operation may become a life-saving necessity. There are few conditions more surely fatal than persisting calculous anuria, and one should not be misled into temporizing by the seeming favorable condition of the patient. In such cases, as elsewhere has been said, the mortality increases with the time elapsing between the onset of anuria and its relief. Surely, cystoscopic methods should not be persisted in if not immediately successful. The mortality from operation is roughly 25 per cent in those not operated upon before the fourth day, 30 per cent before the fifth day and 42 per cent before the sixth day. Such a high mortality in the cases operated upon, together with a 72 per cent mortality in those not operated upon, speaks volumes against temporizing with a thing of so serious a nature.

It is only when cystoscopy or intravenous pyelography has proved that a stone is not blocking the lumen that one should wait for the passage of a ureteral stone. Just how long one should wait in such cases depends entirely upon the condition and comfort of the patient. It has been shown that an enormous majority of stones that engage in the ureteropelvic junction will be delivered into the bladder without instrumental aid. It has been further shown that much can be done cystoscopically to hasten the passage of tardy stones (see section on Cystoscopy) and, where these means are available, they should be resorted to. For, as long as a stone is in the ureter it is an element of danger to the patient, danger so great in import, at times, that its removal by one means or another is much to the patient's advantage.

If, however, these cystoscopic efforts at removal are not successful and there are no other contraindications to it, one may await Nature's efforts at removal. The writer commonly has allowed such patients to remain under observation for weeks and, finally, had them deliver the stone.

Even after the stone has been recovered it should not be forgotten that stones in the kidney do not form without cause, and an effort should be made to determine the cause and remove it, if possible. Even then, it is a wise precaution to have an x-ray study made on these patients at least once a year for several years.

**Ureteral Tuberculosis.**—Tuberculous infection of the ureter is almost invariably secondary to tuberculosis of the corresponding kidney. Beginning as isolated areas of tubercles of the mucosal lining, the disease spreads to all the coats of the ureter. The structure becomes greatly thickened and, later, as fibrous changes occur, the entire channel shortens, causing retraction and retrodisplacement of the corresponding ureteral orifice. It becomes a more or less rigid tube incapable of its former peristaltic contractions.

As a rule, such marked changes in the ureteral walls are of slow formation (usually three years or more), during which time the kidney almost invariably has undergone almost complete destruction. Occasionally, the ureteral lumen becomes entirely occluded, causing the so-called auto-nephrectomy.

**Ureteral New Growths.**—Though by no means of frequent occurrence,

new growths of the ureter are of sufficient importance to the urologist to merit discussion. These growths may be either primary in the ureter or secondary to growths in the renal pelvis, bladder, prostate, uterus or more distant organs. Practically always epithelial in nature, such growths occur



Fig. 76—Papillomatosis of the kidney pelvis and ureter with a papilloma protruding from the ureteral orifice

as benign papillomata (18 per cent) or squamous celled or medullary carcinomata (20 per cent). Sarcoma is exceedingly rare.

In the causation of primary malignant growths prolonged irritation apparently plays a part in most cases. Leukoplakia, at times, precedes their occurrence. More than 60 per cent of such growths occur in the lower portion of the ureter.

The incidence of secondary growths, both benign and malignant, is very common in the presence of such growths in the kidney pelvis, less common in vesical neoplasm, except so far as vesical growth may involve the intramural portion of the ureter.

*Symptoms.*—Ureteral new growths rarely give any pathognomonic subjective ureteral symptoms. There may be pain in the loin or colicky pain from ureteral obstruction. The predominating symptoms, aside from hematuria, are those of renal back-pressure. And it is usually in the studies for the cause of these conditions that the ureteral neoplasm is discovered. Often, its discovery is at autopsy. Diagnosis today is more common during life than before urographic studies were so freely indulged in. The characteristic urogram of ureteral new growth shows a single defect or a series of filling defects and often leaves little doubt as to their causation.

At times, portions of the papilloma or papillary carcinoma protrude from the ureteral orifice. A number of such cases have been reported and most urologists of experience have seen several cases wherein papillomata protruded.

Suspicion of ureteral new growth should be entertained in every vesical growth starting at the ureteral orifice, and the case should not be dismissed without urographic study. It is probable that this, likewise, would be a good rule to follow in cases of repeated recurrences of vesical papilloma.

Patients showing benign papillomata protruding from the ureter should not be considered cured when the visible growth has been destroyed, for it is rare that the only papilloma in the canal is the one protruding. Ureteral new growths should be suspected wherever there is hemorrhage from a ureteral stump following nephrectomy.

*Treatment.*—In the presence of unilateral ureteral neoplasm, either benign or malignant, it is probable that the only appropriate treatment is removal of the entire kidney and ureter, providing the opposite kidney can support life. The possibility of curing even benign papillomatosis of the ureter otherwise is certainly remote. Consequently, the future outlook of the patient is better if the ureter is removed.

## CHAPTER XII

### DISEASES OF THE KIDNEY

#### PYELONEPHRITIS

THE infectious conditions of the kidney are of a nature so varied as almost to defy intelligent classification. So often does one type merge into another, that a running description must be indulged in if one would follow the course of such misfortunes through their sequence of change in many cases. To classify them as to their etiologic factors would result in more confusion than one finds in the more commonly used pathologic classifications. In either mode of description is found the widest of variations in the

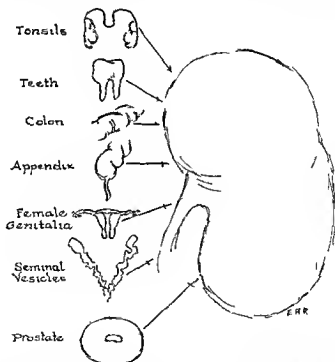


Fig. 277—Various points of focal infection to which renal infection may be secondary.

views of different authorities. Just why this should be readily sensed by one who studies both the pathologic changes and the myriad etiologic factors that may play a part in the infection of these organs.

When one views the question from its clinical aspects, however, he can escape much of this confusion. For there is not such a wide variation between the systemic reactions to renal infections in different individuals as there are in the other two modes of classification. Such a mode of consideration also blends more with a work wherein an effort is being made to portray the clinical aspects of urogenital maladies.

**Etiology.**—As has been said, the possible underlying causes of renal infection are almost countless in number. They range from the mere passage of a sound, on through fields of focal infective transference by one means or another, direct continuity from contiguous structures, and those wherein urinary back-pressure plays such an important part. And, because of the varying reactive powers of different kidneys, no one can predict just what pathologic picture will be the intermediate or end result.

The possible modes of infective transference, however, are far more limited. For, here we have but the blood and lymph streams, contiguous structures and urinary back-pressure to consider. Much of a decidedly unconvincing nature has been done to demonstrate the possibility of lymphatic transference of infections from the bladder to the kidney by way of the ureteral lymph channels. Their segmental distribution along the walls of this canal gives little reason for believing that such a thing is possible. That lymph channels do pass from the large bowel to the kidney surface, and that they can and do transfer infection seems to be proved. Thomson-Walker is of the opinion that the most common source of blood- and lymph-borne renal infections is the bowel, although there are those of wide experience who question so sweeping a dictum. It is held by most observers that foci in the tonsils are far more commonly an etiologic factor.

That the kidneys of one individual are more vulnerable to such infection than are those of another is outstanding. And, while most such renal infections are bilateral, there usually is a more marked change in one organ than in the other. Often, this is so great that it entirely overshadows whatever infection may exist in the other kidney. At times, and as usually is the case with the lesion bearing the name renal carbuncle, the infection is confined to only a portion of one kidney.

Renal infections may accompany or follow any of the acute infectious diseases: infections of the skin, tonsils, teeth, gallbladder, appendix, lower urogenital tract, intestine, in fact, almost any infective lesion to which man is susceptible. At times, predisposing factors, such as lowered physical states, prolonged exposure, previous medical kidney diseases, chemical irritation, injury, and other things seem to play a part. Often, the true etiologic factors are of such an obscure nature as to elude discovery.

**Pathology.**—The pathologic picture of renal infections embraces a field of great breadth. On the one hand, we see in the milder cases of pyelonephritis a disease process spending itself in the pyramids and, on the other, we see a kidney studded with minute abscesses, the seat of large septic infarcts or undergoing complete destruction as the result of large abscess cavities.

The pathology of that usually evanescent clinical occurrence, urethral fever, which is now considered to be a mild pyelonephritis, is not known. If there is any such pathology, it must be of the most fleeting nature. For in most cases, the whole affair is over in a few hours and it leaves no trace of its former presence.

On the other hand, there is a very definite pathologic process associated with true acute pyelonephritis. The kidney, grossly, is large, soft, dark from venous turgescence and obviously not a normal organ. There may be small excrescences on its surface, ranging in size from a few millimeters

to 1 cm or larger some of which contain demonstrable pus. On section these may be found distributed through the cortex together with many evidences of small intrarenal hemorrhages. In some places wedge shaped infarcts are to be seen. The pyramids usually are somewhat paler than normal in contrast with the darkened cortex. The renal tubules and often the glomeruli are badly damaged. The renal pelvis commonly shows many petechial hemorrhages and other evidences of inflammation. It is because of this latter that the term pyelonephritis has come so generally into use to replace the older terms that frequently were descriptive of only a small portion of the disease process.

Beyond the above if the patient survives the kidney slowly goes on to the development of changes that we have come to view as chronic pyelonephritis and which we designate as such. There are of course many intermediate stages between the acute stage and that wherein the contractive evidences of the former acuteness are so well developed as to deserve the name chronic. In the chronic stage the kidney usually is smaller than normal firm in consistency irregular in outline and may show marked areas that become filled in with fibrous tissue. The capsule is so densely adherent as often to preclude the possibility of stripping it from the organ. On section the entire kidney is pale and often almost creaks on the knife as the result of its contained fibrosis. Cysts of various sizes may be encountered some filled with pus and the others with a yellowish limpid fluid. The kidney pelvis shows a marked chronic inflammation wherein the two conditions pyelitis granulosa and pyelitis cystica are not uncommon. Microscopically fibrous tissue seems everywhere in evidence and the glomeruli and tubules both are damaged badly the picture being largely that of advanced interstitial nephritis.

**Bacteriology**—Seemingly almost any pyogenic organism may be the direct cause of pyelonephritis. The most commonly found in the urine however are the colon bacillus staphylococcus and the streptococcus. Though in urinary cultures colon bacilli predominate it is probable that their presence in most cases is a secondary matter and that staphylococci and streptococci are the primordial organisms so far as the causes of the lesions are concerned.

**Clinical Aspect**—In most descriptions of pyelonephritis the disease clinically is divided into the acute and chronic varieties. The former usually is divided further into the mild fulminating and acute. The former being usually those mild evanescent cases that last from a few hours to several days. The fulminating cases are those of an almost explosive type wherein almost every abdominal lesion but renal infection is suspected and in which early death is of common occurrence. So called acute pyelonephritis embraces that far larger group wherein though the onset may be highly dramatic the disease lasts for quite a time and frequently merges into the chronic condition.

The chronic type has been classified in many different ways and in it often have been included such things as infected hydronephrosis prolonged bacteriuria and pyuria and almost all of the infective conditions that can occur in the upper urinary tract. There have been used also many different designations that have to do more with cause than with condition. Thus such terms have been used as hematogenous lymphogenous secondary or



ascending, chronic suppurating, and the like. And it is because of these and the inclusion of other things that the subject is such a confusing one.

For present purposes it will be of more value to strip things down to the simpler classification of acute and chronic, citing such symptomatic and clinical variations as commonly occur in each. There is, however, value in dividing the acute cases into the mild, fulminating, and, for want of a better term, acute prolonged, despite the seeming contradiction of terms.

**Symptoms.—Mild Pyelonephritis.**—If one is to include under this heading the commonly called "urethral chill" resulting from the passage of urethral instruments, he must include with this group those patients who, some hours after such instrumentation have a chill, a rise of temperature and a sweat and are perfectly well the next day.

The term, however, generally is used to designate those cases wherein there occur a rigor or chill with a temperature elevation ranging from 101° to 104° F. This is accompanied with and followed by pain in the lumbar region which may be confined to one side but, generally, is on both. There is usually some tenderness to be elicited by bimanual pressure or ballottement over one or both kidneys. The urine usually is slightly hazy, rarely hematuric, and increased in quantity. There often is a vesical irritation giving a frequency of urination much out of conformity with the increased quantity of urine. Usually, in from three to five days, the symptoms subside, the urine becomes clear, and the patient is entirely well by the end of two weeks.

Such patients may present the confusing pain transferences so common to the more dramatic varieties and not a few of them have been operated upon for abdominal conditions that did not exist. On the other hand, some supposed cases of mild pyelonephritis, in reality have turned out to be pneumonia. One should not lose sight of the fact that both pyuria and bacteriuria are by no means uncommon, and that, by allowing himself to place too much importance upon these, he easily may be misled.

**Fulminating Pyelonephritis.**—As the use of the word would suggest, there is a profound general toxemia, and early stupor or coma frequently occurs. Acute gastro-intestinal symptoms, such as vomiting and pain, are common. The temperature, after a chill, quickly rises to 104° or 105° F., or higher, the urine is greatly reduced in quantity, or true suppression may occur. It contains blood and pus casts, often red blood-cells and many bacteria.

There may be an abdominal rigidity highly suggestive of some acute abdominal infection associated with peritonitis. Ballottement, where abdominal rigidity will permit it, usually elicits marked renal sensitiveness. Most patients pass into coma and die within a short time. Particularly is this so if the abdominal symptoms suggestive of an "acute abdomen" have been the cause of misleading the surgeon into the performance of an abdominal operation.

**Acute Prolonged Pyelonephritis.**—The attack is initiated by a chill, followed by a temperature ranging from 102° to 105° F., or higher. There usually is much backache and abdominal pain and, not infrequently, there occurs a degree of rigidity of the belly wall that is highly suggestive of some acute abdominal pathology. There even may be attacks of ureteral colic. The tenderness in the costovertebral space may be pronounced and,

as the condition most commonly is unilateral there may be a palpable kidney on one side and not the other. Abdominal tenderness and rigidity however frequently make such determinations impossible in the early stages. Frequently there is marked toxemia associated with gastrointestinal upsets usually vomiting and not uncommonly mental symptoms such as drowsiness irritation or delirium.

The temperature is of the septic type and long continued. It is notable for its irregularity. Frequently it soars to great heights and in a few hours drops to normal or nearly so only to rise and fall again. Even after it has become normal it frequently can be elevated sharply by even slight activity on the part of the patient.

The urine is scanty, high colored and contains pus, blood cells, casts and many bacteria. The leukocyte count is high and at times there is a true bacteriuria.

Gradually the patient either improves or begins to show marked signs of failing renal function. The tongue becomes much drier, brown and cracked and there are perhaps hiccough, somnolence, coma and death.

*Chronic Pyelonephritis*—When acute pyelonephritis subsides there frequently is left a chronic suppurative involvement of the kidney, the clinical course of which seems to vary considerably with the source of the original infection. If this be hematogenous or lymphogenous in origin the pathology seems to spend itself largely on the kidney itself. If on the other hand the cause has been by ascension from the lower tract and particularly if the true cause has been urinary back pressure the story often is an entirely different one. Here there is a thinning of kidney substance *from pelvic pressure and the pelvis itself often is markedly dilated and inflamed.* Commonly the condition is that of infected hydronephrosis.

That form of pyelonephritis that we speak of as hematogenous or lymphogenous though it also may be occasioned by lower tract trauma in the entire absence of obstruction is more commonly associated with repeated attacks resembling the mild pyelonephritis described. The renal symptoms may be slight and frequently they are overshadowed entirely by the vesical symptoms usually present. There is a polyuria due to the increased amount of low specific gravity urine excreted and the frequency that would accompany this commonly is increased markedly by vesical irritation. These are the patients who under the unjustified use of that satisfying near diagnosis, cystitis, often are allowed to drift along for months or years without a true diagnosis.

From time to time there are mild seizures resembling mild acute pyelonephritis. These frequently are followed by prolonged periods of seeming good health aside from the pyuria and urinary frequency. The kidney or kidneys as the case may be have reduced greatly in size so that they are not palpable. Where the condition is bilateral failing renal function ushers in the clinical picture so characteristic of an inability of these organs to remove the waste products from the blood.

Where the lesion is confined to one kidney as it commonly is the signs of failing renal function may be less pronounced or entirely absent. Unless the affected organ is removed surgically the toxic load may embarrass the other kidney sufficiently to produce unmistakable signs of failing renal function.

Just what is to be the clinical course of back-pressure pyelonephritis depends largely upon a number of factors, not the least of which is the speed with which the condition causing the back-pressure is removed. Acute seizures of such pyelonephritis frequently are the terminal events in prostatic obstruction wherein both trauma and infection have been introduced in the efforts toward urinary relief. In its slower forms it frequently is the cause of death in the presence of other types of obstruction to either the ureters or urethra.

The more chronic forms, however, frequently follow intermittent urinary blockage such as are seen in some cases of urethral stricture, pregnancy, stone, and prostatic obstruction and, usually, are associated with much ureteral and pelvic dilatation. Occasionally, such a kidney recovers greatly if the obstruction is removed. Particularly is this the situation in the pyelonephritis of pregnancy and urethral stricture. More often, there is a progressing destruction of one kidney.

Renal pain, usually of a dull, aching character, is common. It may be present at times and then absent for long periods. The temperature, except during acute exacerbations or periods of urinary block, is at or near normal. The urine usually is of low specific gravity and contains pus. During periods of block in unilateral disease the urine may be clear.

There usually is a marked cystitis but occasionally one finds on cystoscopic study only a slightly injected bladder wall showing a few flecks of pus and phosphates. The history, the cystitis, and the character of the urine generally give ample reason for cystoscopic and other studies of the upper urinary tract. Stone formations are by no means uncommon and these, in their efforts at descent, rather frequently lead to upper tract study.

**Diagnosis.—Acute Pyelonephritis.**—The diagnosis in the early stages of acute pyelonephritis, particularly in those patients having fulminant attacks, is not always the easy matter that one would suppose. The fact that it can simulate many acute intra-abdominal lesions often leads to mistaken diagnosis. The presence of infection elsewhere in the body, the recent passage of urethral instruments, the great reduction in urinary output or, even, suppression, the tenderness and pain in the renal region, and the pyuria—these factors should lead one to suspect such a condition very strongly. In the later stages the marked irregularity in the temperature range, together with the other symptoms in the kidney and in the urine, should leave little doubt.

**Chronic Pyelonephritis.**—In the diagnosis of chronic pyelonephritis, the cystoscopic procedures so commonly contraindicated in the acute condition become of the utmost value. In fact, it is upon the ureteral catheter, intravenous or retrograde pyelography, differential renal function tests, and the x-ray, physical, and urinary findings that diagnosis mostly depends. All of these are considered in their appropriate places in the section on cystoscopy.

**Prophylaxis.**—The matter of prevention looms large in the treatment of all renal infections. For many of them are the result of easily preventable conditions. The more general attention to teeth and tonsils that holds today should do much to reduce the numbers of such renal infections. In fact, the better attention being given to all focal infective conditions is a step in the direction of prophylaxis. While this better attention applies,

also, to urogenital infections in general, it is a fact easy of demonstration that they have not received so large and intelligent a degree of consideration as have infections in most other portions of the body. The greater publicity being given to the host of urinary antiseptics, whether they have merit or not, undoubtedly has done much to center attention upon urinary infections and lead to a better type of study of them than heretofore has been generally indulged in.

A wider circulation of the knowledge that the febrile reactions so commonly occurring after urethral instrumentation are suggestive of pyelonephritis, should urge a more careful aseptic technic in their use. The fact that urethral chill is rare in those patients with urethral stricture whose urethrae have been cleansed carefully prior to the passage of a sterile instrument, should arrest attention. Knowledge of the further fact that, even in the presence of vesical outlet obstruction, fever rarely follows urethral instrumentation properly done if a good quantity of some efficient antiseptic solution is left in the bladder after the procedure, should be productive of good. Added to this, should be an understanding that there often is a right and a wrong time for such work and that there are patients in whom urethral instrumentation may be fatal.

The most careful study of the causes of pyuria in all types of patients would do much to prevent renal infections. Also, it would prevent many of the terminal stages of renal infection that comprise such a large part of urogenital surgery. Particularly is this so of those renal destructions due to stone and obstruction. Countless obstructive uropathies have waved their flags of distress for months or years before a careful urologic study has been resorted to, or even thought of. And, in this regard, the urologist owes it to those in general practice to see that they become more conversant with these danger signals and have a better knowledge of the great advances in their specialty that make possible so attractively small a margin of diagnostic error.

**Treatment—Acute Pyelonephritis.**—During the early stages of acute nonobstructive pyelonephritis the treatment should be directed toward the relief of greatly embarrassed renal function. Fluids should be pushed, catharsis obtained, and such medical measures carried out as apply to the treatment of acute renal decompensation no matter what its cause. If improvement follows these, they should be continued until the initial attack has passed. A careful search should be made for causal infective foci and they should be removed if conditions warrant.

A determination of the bacterial cause is highly important as a guide to the proper urinary antiseptic to employ. If the causal bacterium is a gram negative one, the administration of sulfanilamide is highly indicated, if it is either the staphylococcus or the *Streptococcus faecalis*, this drug is of little value. Here sulfathiazol is the drug of choice. Some form of mandelic acid commonly is markedly effective. Drug administration, however, should be carried out with due regard to the functional possibilities of the kidneys to avoid cumulative action and marked toxic side effects. The same, indeed, applies to efforts toward both urinary alkalization or acidification, for poorly excreting kidneys may bring about a decided alkalosis or acidosis as the case may be.

Every effort should be made to prove that the pyelonephritis is not of

obstructive origin and, to this end, the most valuable means is intravenous urography. This, however, is not without danger in the presence of extremely low renal excretory values.

Where the pyelonephritis is due to obstruction, the obstruction should be removed, if possible. At least, measures should be taken to assure pelvic drainage. At times, this may require an indwelling urethral catheter, or a suprapubic cystostomy; or, where the obstruction is ureteral, an indwelling ureteral catheter may tide the patient over until it is safe to give proper attention to the cause of the obstruction. The last is particularly true of the pyelonephritis of pregnancy, and, by its prompt and intelligent use, many kidneys can be saved which, otherwise, would be destroyed.

*Chronic Pyelonephritis.*—Here, complete urologic study is more generally applicable, and it is rare that the true cause of the pyelonephritis cannot be discovered; often it can be removed in time to save the kidney and to restore to it much of its lost functional value. Upon many occasions renal decapsulation or, even, nephrectomy may be the only wise course after study has shown that the less involved or uninvolved kidney has a functional value that can support life. Often, the toxic overload taken from it by the removal of a largely destroyed kidney will bring about a greater increase in its functional possibilities. The studies needed in such cases are considered at length in the section on cystoscopy.

### PYELITIS

There is no doubt that the term pyelitis has been a greatly misused one. If one may reason by analogy from the behavior of similarly constructed surfaces in the urogenital tract, he would expect the kidney pelvis to be rather a resistant structure, certainly not prone to spontaneous inflammations. He would class it with the general bladder wall, wherein inflammation almost invariably is a manifestation of other pathology. Thus, it is probable that, from structure alone, pyelitis as an isolated lesion almost does not exist. Pyelitis as a symptom of obstruction, plus infection, or as the result of an infective feeder in the kidney or a stone in the kidney pelvis, does exist. But to consider pyelitis a disease itself, is to encourage the overlooking of the immediate causes, and the application of treatment where it is likely to do the least good.

It is therefore of definite value that we view pyelitis as only an accompanying inflammation, and that we cease treating it to the exclusion of its causal lesions. We safely may lay down the rule, that dilating surfaces exhibiting transitional epithelium seldom, if ever, develop spontaneous inflammation, no matter what bacteria reach them. If, however, their surfaces are changed by retained infected urine, instrumental or chemical trauma or the constant irritation of pus from some other feeder, they do become inflamed and, perhaps, infected. If the conditions bringing this about are long continued, there may occur such a great change in the surface as to make it hold its inflammation for some length of time after these precipitating factors have ceased to exist. If, on the other hand, these factors exert their influences for only a brief period, the reactive powers of such surfaces are of so high an order that they quickly recover whether treatment is applied or not.

Further, it is inconceivable that such inflammations could limit themselves to these transitional surfaces alone when they are in such close proximity to the renal tubules with their poorly resistant columnar and cuboidal linings. Wherefore, it is obvious that the term pyelonephritis would be a far more appropriate one in most cases.

Though this be true it is obvious that the term pyelitis has become a fixture in our urologic nomenclature. There is not, however, any reason why it must continue to hold a place of any more importance than does cystitis, which, even in poorly informed circles is now considered the name of rather a common symptom concomitant with other disease processes.

Surely, the more we have thought of and treated the kidney pelvis alone, the poorer have been our results. Our advances have been made as the result of measures aimed at discovering and correcting other and causal pathology. This having been done, the kidney pelvis usually has cured its own inflammation.

Of late years this has been largely the urologic attitude in our cases of acute pyelitis (pyelonephritis) accompanying pregnancy or resulting from other types of ureteral block. True we may have treated the kidney pelvis, but the obstruction causing it has occupied a greater part of our attention.

Chronic pyelitis in the absence of demonstrable obstruction at or below the ureteropelvic junction, stone or definite evidences of renal cavitation or infection, has been viewed largely from a different angle. Here we have more often felt that the fault lay in the pelvic mucosa itself. But it is probable that we should have abandoned this attitude if we had thought of the continued inflammation as an evidence that some portion of the pelvis perhaps a lower calix, was unable to drain properly, and that this pool of infected urine was the feeding factor. This readily could have been answered by a roentgenogram some time after a retrograde pyelogram and it is probable that a posture that served to empty this residuum would do much toward curing the pelvic inflammation. Even so simple a procedure as lying on the opposite side should bring this about in many cases.

In order to prove by roentgenograms that a lower calix does not empty, it is necessary that the patient be kept in an upright position during the entire time between the injection of the pyelographic medium and the taking of the later film. One's chance of demonstrating such retention in a calix is greater with the more clearly marked films obtained by the retrograde method than by intravenous urography, although the latter may serve the purpose in some cases.

It is to be remembered that the calices empty themselves by muscular contraction, but that tissue pressure alone may be sufficient to empty them with the patient in a recumbent position. It is probable that gravity alone would empty all but the lower calices even in the presence of faulty contraction of their 'milking muscles'. Hence, in the absence of stone or easily demonstrated cavitation it is probable that only the lower calices would serve as feeding pools for the perpetuation of pyelitis in the absence of lower obstruction. The more closely such cases are studied, the rarer it will be to find pyelitis as an isolated condition.

One readily may divide his cases into two major groups, viz., the febrile and afebrile. Fever in the presence of definite pyelitis, almost, if not in

variably, means obstruction at or below the ureteropelvic junction. For the kidney pelvis is a very poor absorbing surface. But when the pelvic contents are under enough pressure, absorption is not needed, for it has been shown that fluids are forced into the blood vessels at the peripyramidal zone of the calix. Recurring attacks of febrile pyelitis mean recurring obstructions.

Afebrile pyelitis most commonly is a long-continued affair and, at times, is due to lower obstruction in the ureter. Frequently, the obstruction is at or distal to the vesical outlet, and the pyelitis is a part of a general mucosal inflammation of the bladder and ureter because the ureteral orifice has given way and the upper tract is subjected to the same back-pressure influences as is the bladder. At times, it is due to pelvic stone, lack of caliceal contraction, or renal infection.

**Symptoms.**—In febrile cases of pyelitis there may be a sudden or gradual onset of temperature elevation. The attack often is initiated with a chill followed by a temperature commonly reaching as high as 104° or 105° F. The chill may be repeated. There may be nausea, vomiting, and prostration associated with sweating. Many cases are preceded by an attack of ureteral colic caused by efforts to pass either a stone, blood-clot, or slug of pus.

In a good number of cases the fever is of gradual onset and there may be little or no pain in the renal region. Particularly is this so in the pyelitis of pregnancy. And elevations of temperature at this time, not otherwise explained, should arouse a suspicion of pyelitis. During pregnancy there usually is some ureteropelvic dilatation, and the kidney pelvis thus dilated is less prone to cause pain on a complete obstruction than is a pelvis not so routinely abused. One should not allow a pus-free urine to engender too great a degree of complacency, since in a complete block the pus is not entering the bladder, and if the other kidney or pelvis is not infected there may be a negative urine.

Afebrile pyelitis more often causes no definite renal symptoms, pyuria being the only constant one. Often, the pyuria is associated with secondary vesical symptoms. So pronounced may be these bladder symptoms, as greatly to overshadow the pelvic condition, which is revealed only by a study of the catheterized kidney urines.

In the presence of a long-standing staphylococcic pyelitis there may be entire absence of pus in the urine, the cloudiness being caused by phosphates and bacteria. In colon bacillus infections the pus also may be absent, bacteria alone causing haziness of the urine.

**Diagnosis.**—In the presence of acute febrile pyelitis the diagnosis usually rests with renal pain, temperature type, urinalysis, ureteral catheterization, and urography. The sudden cessation of pyuria accompanied by fever is, in itself, almost diagnostic. This may not occur, however, if cystitis is a further complication.

The onset of renal pain and temperature elevation, even in the absence of a previously known pyuria, is of itself suggestive. Under such circumstances, there commonly is a septic type of temperature range accompanied by chills. If the condition is due to a stone, a blood-clot, or a slug of tissue in the ureter there generally is a typical ureteral colic. One should not be misled by the absence of pus in the urine, as has been said, for, if

the ureteral block is complete and the pus forming area is above it a normal urine is common

Acute pyelitis may be simulated by acute cortical infection of the kidney. The differential diagnosis is by no means difficult to make by ureteral catheterization. In acute pyelitis the catheter if it passes the obstruction evacuates a large amount of purulent urine. In acute cortical infections there usually is no difficulty in passing a catheter into the kidney pelvis. There is no retained urine and the urine obtained usually shows no great number of leukocytes. The few red blood cells found in the voided urine together with a mild albuminuria suggest that the erythrocytes obtained by catheter are not alone those so commonly seen in specimens obtained by ureteral catheterization. Perinephric abscess rarely shows such an acute onset and usually gives symptoms confined to the flank. Also the roentgenographic obliteration of the corresponding line of the psoas muscle so characteristic of the perinephric abscess makes differentiation less difficult. Care should be taken to rule out nonobstructive pyelonephritis.

Tuberculous pyelitis rather commonly escapes detection because other bacteria are found. Every case of persistent pyelitis in the absence of obstruction should be suspected of being of tuberculous origin until repeated studies have proved the reverse. An unfortunate number of cases of renal tuberculosis escape early discovery because pyuria has been considered to be due to other bacteria more easily demonstrated than are tubercle bacilli. So true is this that one makes no mistake in viewing with suspicion bacterial diagnoses too easily arrived at.

**Treatment**—Being mainly a disease process secondary to some other lesion the treatment largely is that of the cause. In the presence of acute febrile pyelitis the urgent call is for relief of the ureteral obstruction. Upon its accomplishment by catheter drainage the temperature quickly subsides as do the other symptoms. If drainage is obtained it should be continued for some days. The catheter should be kept in for at least five days and when withdrawn it should be immediately replaced if there is even a slight rise in temperature unless surgical means are to be resorted to for the permanent removal of the cause of obstruction.

*Efforts at catheter drainage failing it is imperative that things should not be left to spontaneous relief of the obstruction for more than a few days. Certainly if at the end of three days drainage has not been established operation should be resorted to.*

In the presence of chronic pyelitis that for one reason or other does not lend itself to surgical relief many methods of treatment have been resorted to. Pelvic lavage with some one of the commonly used antiseptic solutions occasionally gives benefit. More often it is quite disappointing. The solutions most generally used are 2 per cent silver nitrate though some have advised from 2 to 5 per cent mercurochrome 1:1000 neutral acriflavine 5 per cent collargol 10 per cent mild protein silver and the like.

For pyelitis due to staphylococcal infections intravenous injections of neoarsphenamine at times give benefit. Oscillations from alkalinization to acidification of the urine seem to have a curative action in some. A far larger percentage are helped by the establishment of a mild ketosis as by the ketogenic diet so ably worked out by A. L. Clark. Particularly is this so in the presence of colon bacillus pyelitis. Recent reports of results ob-



tained by mandelic acid medication are encouraging but disappointments are by no means rare. Sulfathiazol has been of great value in some cases. Sulfanilamide may do much toward solving this most vexing of problems in some cases, particularly those caused by gram-negative bacteria.

### HYDRONEPHROSIS

Hydronephrosis is not a disease, but a result. It is, in the majority of the cases, a true pressure-dilatation of the kidney pelvis with a later pressure-thinning of the kidney tissue. Whether or not the ureters are dilated depends almost entirely upon the location of the obstruction causing the hydronephrosis. As with the rest of the urinary conducting structures, the upper portion of the tract is singularly ill fitted to withstand great, or even minor increases in internal pressure. The thin musculature of the renal pelvis and the comparatively soft renal tissue offer but poor resistance to such a force. The pelvis dilates and the kidney undergoes a pressure atrophy which may leave it but a shell surrounding large internal sacculations. This sacculated condition has been shown by Hinman and others to result mainly from the greater resistance of the renal arterial sup-

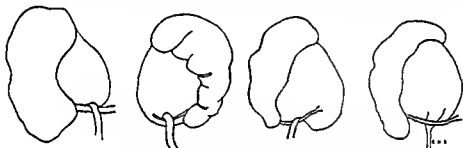


Fig. 228.—Drawings to show the effects of obstruction at the ureteropelvic area as the results of aberrant renal arteries.

ply to increases of internal pressure. Such a condition allows kidney substance, the nourishment of which has been interfered with, to be pushed onward more rapidly, in much the same way as we see the back-pressure bladder sacculate between the hypertrophied muscle bands.

In its final analysis, hydronephrosis is the picture impressed upon the structures by a perversion of the normal mechanics of the urinary conducting channels, the portrait of the victim and not of the culprit.

**Etiology.**—The cause of hydronephrosis is obstruction, either constant or intermittent, to the normal emptying of the ureter or renal pelvis. This obstruction may be either in the ureter, at the bladder outlet, or in the urethra. For this reason, a diagnosis of hydronephrosis is that of a result for which a cause must be found. The cause may be one or several of a vast number of pathologic entities, among which should be mentioned the following: aberrant renal vessels, obstructed ureters, stricture, uterine growth, pressure upon the ureter from without, pin-point ureteral meatus, prostatic obstruction, urethral stricture, congenital urethral valves, pin-point preputial meatus, spinal-cord disease, and even long-continued straining at urination in the absence of true obstruction.

There is some evidence to suggest that, upon rare occasions, long-standing infection of the ureter and kidney pelvis may result in an atrophic dilatation of these structures, in the absence of a lesion causing definite obstruction. On the other hand, one should not overlook the possibility that the inflammatory condition, in itself, may have caused enough obstruction from time to time to bring about the dilatation ascribed to the stretching of the structures from inflammation alone, a thing rather hard to visualize.

In the question of etiology, one must also consider, in some cases, the possibility of congenital factors or later muscle atrophy from neurogenic causes. On the other hand, the possibility of dilatation as the result of local muscle spasm must be given place. This phenomenon seemingly accounts

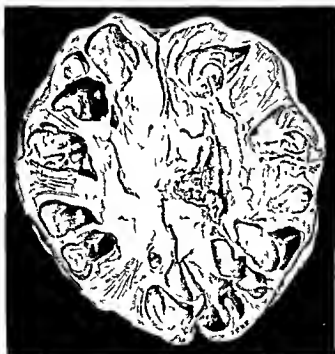


Fig. 229—Calculous pyelonephritis with hydronephrotic cysts (Department of Pathology, University of Pennsylvania)

for the occasional hydronephrosis limited to a group of minor calices with a seemingly demonstrable spasm of their major calyx.

Thus, it may be seen, in our consideration of causes, that mechanics plays by far the most important part, that, though we speak of other possible causes, it is most difficult to prove that at some time during the development of the hydronephrosis obstruction did not exist. Even in our congenital cases this is hard to rule out. And our experiences with renal and ureteral denervation are casting some doubt upon dilatations of neurogenic origin, unless they be due to local spasm.

Clinically, it is obvious that intrapelvic pressure may be increased from either above or below. We see the first mode as the result of renal secretory pressure in ureteral obstruction and the latter as the result of lower

urinary tract obstructions wherein there occurs an ureteral reflux subjecting the upper tract to pressures that even the far better constructed bladder wall finds it difficult to withstand.

**Pathology.**—The pathologic changes of hydronephrosis, aside from dilatation of the conducting structures, usually are most serious and pronounced in their effects upon renal tissue and function. As the possible resistance to intrapelvic pressure differs in different portions of the tract, and differs in the same portions in different individuals, it is obvious that there should be a wide range of pathologic results. In one, the dilatation may be most obvious in a single calix; in another several, or all calices may dilate. Again, there may be little change in the renal structure in the presence of marked pelvic distention. There may be little pelvic dilatation in the presence of marked renal pressure atrophy. More often, when one is marked the other is equally affected.



Fig. 230.—Hydronephrotic destruction of the kidney resulting from lower tract obstruction. (Drawn by courtesy of Dr. Frank Konzelmann.)

As renal substance is subjected to back-pressure it changes its functional output gradually, until in its later stages, it excretes merely water and salts. Until almost destroyed it may excrete these in large quantity.

When the pressure is relieved, the true function returns if there is not complete destruction of renal tissue. The extent to which it approaches normal in quantity depends naturally upon the amount of destruction that has occurred. To just what extent such a kidney may approach normal it is difficult to foretell. In the minor dilatations and, often, those of considerable degree, the renal tissue shows such remarkable recuperative powers as to give the greatest value to conservative methods in treatment. Particularly is this true in the presence of obstructions of fairly short duration. In those of long duration, conditions usually are not so hopeful, though,

even here it is at times good procedure to avoid nephrectomy where possible

While Hinman has shown by animal experimentation that resumption of function by a hydronephrotic kidney is rare when the other kidney has undergone a compensatory hypertrophy of pronounced degree there is much evidence to show that one cannot apply too rigidly to human beings things that seem the rule in the lower animals. And it is a fact that no one can tell how much of its lost function even a considerably dilated kidney may regain.

**Symptoms**—There are no pathognomonic symptoms of hydronephrosis. The art of cystoscopy has relegated our earlier dreams in this regard to the realm of regretful memories. Time was when the hydronephrotic kidney gave supposedly characteristic symptoms. The teaching of thirty years ago had the so called flush tank symptom and hydronephrosis so thoroughly wedded as to make the student believe that one could not exist without its mate. How such a symptom which most of us have rarely encountered could be considered the one pathognomonic symptom of so common a condition as hydronephrosis is almost impossible to understand. In those days a patient who passed a fair amount of urine and after a short interval could repeat the procedure had a hydronephrosis. Today he is either excessively nervous or has some condition that only cystoscopy or a urogram will reveal and with only the rarest of chances is the cause hydronephrosis.

Some patients go on to the stage of complete hydronephrotic destruction of a kidney without ever having had a suggestive symptom to call attention to the advancing process. Others have the most acute symptoms so early that dilatation is difficult to prove despite all our diagnostic refinements. And in between these two there are patients who experience a large assortment of leading symptoms almost all of which may be just as indicative of other things.

There may be pain in the hydronephrotic kidney or the pain may be in its well fellow from the intrarenal pressure associated with its compensatory hypertrophy. There may be a history of attacks of colicky pain or of steady aching pain in the renal region. The renal symptoms may be entirely masked by some extrarenal cause. There may be a palpable abdominal tumor but more often there is none. Hematuria may occur and continue.

It is rare indeed that hydronephrosis presents symptoms that in themselves are safely diagnostic. And as such a diagnosis is that of a result and seldom of its cause it is obvious that symptoms as is the case with most urogenital conditions are merely the things that call for further study by cystoscopy and x ray. Assuredly they do not call for operation without these things to point the way.

**Diagnosis**—The diagnosis of hydronephrosis is largely dependent upon either intravenous or retrograde pyelography. It is rare indeed that it can be made without them. By the use of these procedures it usually is a simple matter to determine both its presence and its cause. In the latter however cystoscopy frequently gives data of the most valuable nature.

**Treatment**—The treatment of hydronephrosis is primarily that of its cause. Often the removal of obstruction is all that is needed. Where ad

vanced renal changes have taken place, nephrectomy or even reno-ureterectomy may be necessary. Wherever it is possible to relieve the obstruction, and if emergency nephrectomy is not demanded, the utmost conservatism is indicated to give the kidney an opportunity to reestablish what function it can.

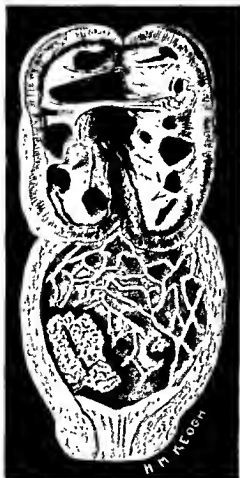


Fig. 231.—Papillary carcinoma obstructing the ureteral orifice and causing hydronephrosis with later infection of the kidney—chronic suppurative pyonephrosis. (Drawn by courtesy of Dr. Frank Konzelmann.)

### PYONEPHROSIS

The term pyonephrosis has been used somewhat indiscriminately in the past. Our better knowledge of the pathology of urinary infections today, however, gives considerable value in a more strict limitation of the word pyonephrosis as a designation for those cases wherein the kidney structure is directly attacked and destroyed by purulent infections. To those cases wherein the kidney substance is destroyed by a back-pressure atrophy due to obstruction somewhere in the conducting urinary structures, associated with pelvic and often ureteral dilatation as well, we have given the name hydronephrosis when there is no infection. Modern usage

has added to this the term infected hydronephrosis in cases wherein distal obstruction plays a part but the kidney substance itself bears the brunt of the ravages of infection

The routes of infective transference of true pyonephrosis may be of several varieties but more commonly such infections are of either hematogenous or lymphogenous origin. Occasionally the infection may be the residuum of a pyelonephritis due to the reflux of infected urine from the bladder. By far the large majority of pyonephrotic kidneys owe their infection to blood or lymph borne bacteria from the teeth, tonsils, colon, appendix and female genitalia. In contradistinction to infected hydronephrosis, pyonephrosis is largely a disease of the fourth decade of life and beyond. It is far more common in women than in men. Almost invariably it is unilateral.

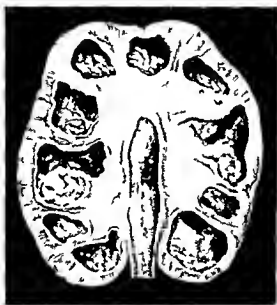


Fig. 232—Advanced pyonephrosis

Of the more frequent varieties of pyonephrosis might be mentioned (a) calculous pyonephrosis (b) tuberculous pyonephrosis (c) pyelonephritic pyonephrosis (d) typhoid pyonephrosis (e) gonorrheal pyonephrosis, though this latter is almost invariably due to an infected hydronephrosis.

**Pathology**—Rarely does a pyonephrotic kidney approach in size that of the hydronephrotic one. Often the increase in size is due to fibrolipomatous changes when the kidney itself is smaller than its noninfected fellow. The pelvis is rarely the seat of marked dilatation, though the calices may be large. As a rule little of the true renal parenchyma is present. There often is much fibrolipomatous thickening of the capsule and perinephric infections are not uncommon. The organ may be composed of large accumulations of inspissated pus (closed type) or it may be merely a group of sacculations (open type). In the latter type calcareous deposits often are found. The other kidney rarely undergoes the marked compensatory hypertrophy so common to chronic hydronephrosis.

**Symptoms.**—The clinical picture depends largely upon the type of renal involvement present. Unless there is great perinephric involvement, pain is rarely a prominent symptom. More commonly, there is a sense of pressure or weight in the costovertebral angle with some tenderness on bimanual palpation. Pyuria, which at times is absent, usually is present to some degree, even in the closed type. Most of the symptoms of pyonephrosis are of a toxic nature in which gastro-intestinal complaints are common.

Unless there is a definite perinephric abscess, there commonly are only intermittent attacks of fever. Night sweats are common, particularly during periods of temperature elevation. Weakness, malaise and loss of weight are usual.

In the closed variety, as it has been said, there commonly is a mild grade of pyuria, though the urine may be free from pus. In the open variety the urine shows much pus. Large slugs of inspissated pus commonly are present. Hematuria is rare. In open pyonephrosis the predominating symptoms often are those of the secondary cystitis.

Renal function generally is lowered owing to the common failure of the opposite kidney to undergo great compensatory hypertrophy, as is the rule in hydronephrosis, even if infected. Regarding this compensatory hypertrophy, an exception must be made of tuberculous pyonephrosis wherein renal function is entirely (or almost entirely) taken over by the well kidney, so that the total output may be normal.

**Diagnosis.**—While the positive diagnosis of pyonephrosis usually rests upon the cystoscopic and roentgenologic findings, there usually are enough subjective or objective symptoms to direct attention toward the diseased kidney. In some cases of open pyonephrosis, where pus has been poured constantly into the bladder, particularly if the infection be tuberculous, the bladder symptoms overshadow all others. This, however, should not mislead greatly if it is shown that the patient is able to empty the bladder entirely. Pronounced and chronic cystitis in the absence of distal obstruction always should direct attention to an infective feeder in the upper tract. Assuredly the time has passed when cystitis was a satisfying diagnosis.

The age of the individual, the common history of repeated attacks of fever, a feeling of tension in the renal region, pyuria, gastro-intestinal symptoms, loss of weight, general malaise, fatigue on slight exertion, and perhaps *a palpable kidney that is far more tender than its fellow, should leave little doubt*. If there are added to these the common cystoscopic findings of a purulent fluid or no fluid at all, coming from the affected side, a reduced total phthalein output, all of which is excreted by the kidney not under suspicion, the diagnosis is practically assured. Intravenous pyelography may, and often does, give findings of the most positive nature, though, at times, it may be wise to resort to retrograde pyelography, if doubt still exists.

**Treatment.**—The treatment of pyonephrosis is nephrectomy. The fact that there may be mild evidences of infection in the opposite kidney does not necessarily alter this dictum. In fact, it gives good reason for it. For it has been shown that such kidneys usually undergo a marked increase in functional capacity and show far greater infection-combating powers when relieved of the excretory strain occasioned by a functionless, suppurating mate.

In the presence of perinephric abscess immediate removal of the functionless kidney may not be a wise procedure, but eventual removal should be carried out. Certainly, there is little place for palliative treatment, unless the patient is in such dire physical straits that any operative procedure would be fatal. Under such circumstances, there is little, aside from the relief of pain and discomfort, that can be done. Cystoscopic procedures have little or nothing to offer.

#### RENAL TUBERCULOSIS

To the urologist, tuberculosis of the kidney is restricted solely to surgical tuberculosis. He does not see the cases of military tuberculosis nor does he see the condition during its predestructive stages wherein the urine

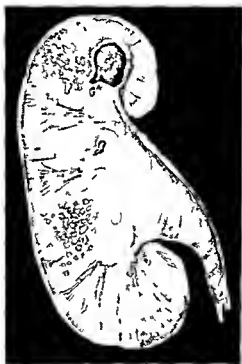


Fig. 233—Sagittal section of a kidney showing tuberculosis with cavitation of the upper pole (Department of Pathology, University of Pennsylvania)

shows albumin and casts only. As a matter of fact, he rarely sees even the early stages of destructive tuberculosis. Generally, the kidney has undergone considerable or complete cavitation. That it has early pathologic stages he recognizes, though he rarely encounters them. Nor does the urologist often see a patient in whom the only demonstrable urogenital involvement is renal. As a rule, there is involvement of the kidney pelvis, ureter, and bladder before the case reaches him. Often, he is greatly saddened by the length of time during which the patient has presented symptoms that should have suggested the nature of the disease.

One would think, from the length of time during which cystitis has been discounted as a disease and labeled a symptom, that it would be rather



rare for cases to be treated for months and even years without a careful investigation as to the real cause. Such, however, is so far from being the case that it is safe to say that 75 per cent of all of the cases of renal tuberculosis reaching the cystoscopist have been treated for cystitis for six months or more. As repeatedly has been stated, cystitis is not a diagnosis, but it has become a diagnostic blanket under which often are hidden things that will cost the patient his health or his life. Cystitis is a medical sign-post that imperatively urges a determination of its cause, and he who lets matters drift, instead of making a careful search for the underlying factors at a time safe for the patient is, at least, not doing as he would be done by.

**Etiology.**—Though it is common to speak of primary renal tuberculosis, there is in reality no such thing. By the term the urologist means



Fig. 234.—Caseous tuberculous sphere in the lower pole of the kidney. (Department of Pathology, University of Pennsylvania.)

that the kidney is the first part of the urogenital tract involved in the given case. He is aware that it is a lesion secondary to some active focus of tuberculosis elsewhere in the body, which focus, when he sees the case, may be entirely healed-in.

The most common foci from which this blood-borne renal infection obtains its tubercle bacilli, are the lungs, tonsils, and gastro-intestinal tract. The older theories of an ascending infection from bladder to kidney, and the possibility of infection by way of lymph channels, have been discarded. If renal infection ever takes place in either manner it must be of the rarest occurrence.

For many years discussion had been waged as to whether one kidney or both kidneys usually are involved, and there is enough evidence pro and con for a continuance of the debate. While it is probable that in

most cases there is early bilateral involvement to the clinician it is obvious that the lesions rarely progress with equal rapidity. An overwhelming number of the cases that come to diagnosis have all the appearance of being confined to one kidney which frequently has undergone massive destruction while the closest studies cannot demonstrate the disease in its fellow. Surgical experience also has done much to demonstrate the usual unilaterality of the disease for countless patients have lived for years after the removal of a destroyed tuberculous kidney without showing any signs of tuberculosis in the remaining one. Thus the urologist views the lesion mostly as a unilateral one but is ever on the alert for the exceptions he is sure to encounter. Seldom if ever is the process equally advanced on both sides if it is bilateral and even in bilateral renal tuberculosis a completely destroyed kidney is at times removed with benefit to its less involved fellow.

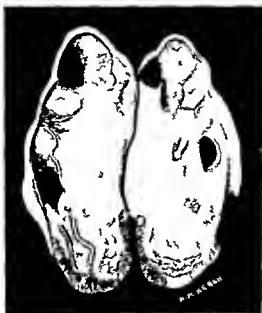


Fig. 235 Chronic fibrocaseous tuberculosis in a hypoplastic kidney (Drawn by courtesy of Dr. Frank Konzelmann.)

**Course of Infection**—Beginning as a few tubercles in one or more portions of the kidney these coalesce and form either a cavity or an ulceration depending upon whether they are in the deeper kidney substance or near the tip of a pyramid. The process is essentially a slow one and just what particular pathologic type the kidney becomes depends upon the location of the infection, the virulence of the organism and the type of tissue resistance. In most cases the initial site of infection is in some portion of the pyramidal tract usually in one or both poles of the kidney. Except in extremely virulent infections the cortical areas show only scattered tubercles that seldom coalesce. Those on the surface may engender a mild grade of perinephritis that usually does no more than cause adhesion of the kidney surface to the surrounding tissues. This more commonly takes place at the upper pole.

Where the infection takes place deep in the parenchyma, the entire kidney may become a mass of discrete or communicating cavities filled with caseous material of varying degrees of fluidity. Other than some general toxicity and urinary changes suggesting a mild grade of nephritis, there may be no symptoms until one or more of these cavities rupture into the renal pelvis.

If, on the other hand, the infection begins at the pyramid tip, it extends upward into the kidney structure and destroys one pyramid after the other. Such a kidney often does not increase greatly in size. Nor does its surface show the globular irregularities of the above variety. As would be ex-



Fig. 236.—Gross specimen of almost complete tuberculous destruction of the kidney. (Courtesy of Dr. Hinman, *Principles and Practice of Urology*, W. B. Saunders Co., Philadelphia.)

pected, tuberculosis of this type does not have the long symptomatically silent period so common to the other. The infective products find their way into the kidney pelvis almost from the start. Despite this fact, it is common to find at operation kidneys of this type that have been overlooked until there is almost no true kidney substance left.

The fibrous type of renal tuberculosis is rare and usually is not known to be tuberculous until microscopic study has proved it so. It has but little bearing upon the present discussion.

Years ago, there was much discussion regarding the possibility that renal tuberculosis would undergo spontaneous cure. In fact, as previously

has been said, there were many internists twenty years ago who insisted that renal tuberculosis was not a definitely surgical lesion, and that they had observed many medical cures. Since then little has been heard about the matter and the lesion has been considered to be a surgical one. Recent pathologic investigation, however, seems to show that, in some cases, small cortical and, perhaps, parenchymal tuberculous foci do heal in. Still, it is to be hoped that these findings will not serve to open up the old question of possible medical cure and thereby needlessly sacrifice lives that surgery could save. The observations have scientific value, but one overwhelming clinical fact remains, viz., that the kidney upon which a positive diagnosis of tuberculosis can be made is doomed to destruction and, if possible, it should be removed as a life-saving procedure.



Fig. 237.—Tuberculous cavitation of the kidney showing calcareous deposits in both the renal structure and the pelvis. (Department of Pathology of the University of Pennsylvania.)

Whether or not tubercle bacilli can filter through a perfectly normal kidney has also been a live topic of discussion. That they do not, seems to have been proved by much recent investigative work. However, though the matter may be one of scientific importance, it is not one of overwhelming clinical importance today. No one advises the removal of a kidney just because he finds a few tubercle bacilli in its urine. If he does find the bacilli, and no other signs of involvement, he keeps the patient under rather close supervision. Present-day diagnosis demands and gets more evidence before it leads to surgical intervention. It reveals incontrovertible proof that the kidney is infected and it usually gives as safe knowledge concerning the health and functional capacity of its fellow.

**Symptoms.**—Aside from the previously mentioned slight general toxemia and, perhaps, slight evidence of nephritis, the real symptoms of renal

tuberculosis usually begin when the lesion opens into the kidney pelvis. If the lesion begins at the tip of a pyramid, some symptoms probably occur before it is very far advanced.

Because a tuberculous kidney, until it is well on the way to destruction, usually excretes a larger quantity of urine of low specific gravity than originally was normal to it, the first symptom in most patients probably is a polyuria. Intermittent polyuria, however, is a rather common thing in many patients, so that the true cause of the initial polyuria with its added frequency of urination is seldom, if ever, discovered until more leading symptoms appear.

Gradually, this initial frequency of urination becomes more and more pronounced, so that the patient is compelled to empty his bladder one or more times at night and becomes aware that he is urinating more often during the day. The frequency may at first be entirely free from pain. The bladder feels full and the patient empties it with no thought other than the frequency.

Some patients complain of vesical discomfort almost from the beginning of their urinary frequency. When vesical symptoms have definitely set in they usually increase rapidly, so that there develops a high degree of intolerance to any amount of urine in the bladder. The patient seems to have time for little else than responding to the calls to empty his bladder. Often, there is an urgency so great that it makes a distant urinal one of the patient's greatest mental hazards. If allowed to pass beyond this stage, he often develops a complete urinary intolerance that gives him a virtual incontinence. Seldom today do we meet patients who have reached this extreme without a determination of the cause, although twenty years ago it was by no means uncommon.

The vesical sensory symptoms begin, usually, as a feeling of deep pelvic discomfort, to locate which the patient places the tips of his fingers to the suprapubic region. This may, at first, be only a vague discomfort associated with his frequency but it gradually becomes a constant burning pain, slightly worse for some time after the bladder is emptied. It increases in intensity as the weeks or months pass until the patient is miserable with any amount of urine in the bladder but dreads to pass it because of the great burning upon urination and the agonizing tenesmus that follows the act. There may even occur a slight terminal bleeding in some cases. The vesical changes that bring this about are considered in the section on Cystoscopy.

As a rule, the advanced stages of the picture of urinary misery described are due to a lack of early diagnosis. At least 80 to 90 per cent of all patients with renal tuberculosis go through some part of this experience and, when they do, there almost invariably is a pyuria to arouse suspicion of the presence of a serious lesion. Further, most of such patients are between the ages of twenty and forty years of age, a time at which vesical outlet obstruction rather rarely intrudes itself.

Theoretically, there should be one or more attacks of transient hematuria, in most cases at the time when tuberculous cavities break into the kidney pelvis. Practically, however, this is noticed in only about 5 per cent of the cases. So that, if it does occur in the others, it is so slight as

to escape the patient's notice. Upon rare occasions there is a profuse hematuria. If one takes the proper view of even slight hematuria realizes that it is at times the first obvious sign of renal tuberculosis and carries out the studies that should be carried out upon every patient with hematuria it is likely that fewer patients will reach advanced stages without discovery.

Acute seizures of renal pain or true ureteral colic likewise occur in about 5 per cent of the cases. This may be due to ureteral blockage by either a tissue slough or blood clot and may be so highly suggestive of efforts to pass a calculus as to mislead. If it is due to the passage of blood clot the cessation of pain is likely to be followed by the voiding of the clot and a moderately profuse hematuria in contradistinction to the usually slight bleeding of stone. The previous urinary symptoms together with the urine itself should arouse a suspicion which at least should urge a study for tubercle bacilli. There may be also a marked temperature elevation during the time of ureteral block particularly if there is a mixed infection of any type.

It is rare that palpable kidney enlargement is a finding certainly in not more than 5 per cent of the cases even when the kidney can be felt one should not lose sight of the fact that he may be palpating the well kidney that has undergone a compensatory hypertrophy.

Very few patients complain of constant pain or even discomfort in the renal region despite the fact that varying grades of perinephritis are almost the rule.

**Diagnosis**—Following the suggestive data that may be in the history the real diagnosis of renal tuberculosis is dependent upon the finding of tubercle bacilli in the urine the cystoscopic study of the bladder and upper urinary tract and what confirmation may be obtained from intravenous urography. All of these are considered under their appropriate headings in the section devoted to cystoscopy. Animal inoculation is slow uncertain and is rarely needed by the urologist of experience. It however has definite value in some doubtful cases.

**Prognosis**—The outlook of the patient with renal tuberculosis depends upon a number of factors which have to do with the resistance of the patient the duration of the lesion before surgery is resorted to the condition of the remaining kidney and the after care of the patient. Without operation most patients die within five years years usually filled with intense suffering. Of those subjected to nephrectomy various authors report from 58 to 77 per cent well and symptom free after four years. Caulk was of the opinion that a patient relieved by operation and perfectly well by the end of a year will remain so.

**Treatment**—It repeatedly has been stressed that the treatment of unilateral renal tuberculosis is nephrectomy. Nephrectomy also may be a means of giving comfort and prolonging life in some cases of bilateral involvement. Under efficient hands the operation bears a direct mortality of about 2.5 per cent.

The need for and the wisdom of nephrectomy depends upon the collected results of studies in which great accuracy is possible and no case should be allowed to drift into a hopeless condition without such studies.

Regarding the status of surgical vs. medical treatment, it is of interest to cite Wildbolz' investigation, which was summarized by Keyes<sup>1</sup> as follows: "Wildbolz records his own conversion from medical to surgical treatment in convincing fashion. He cites cases who three years after nephrectomy were divided as follows: 59 per cent alive and cured, 21 per cent alive but tuberculous, 20 per cent dead. To compare with these, he collected 316 cases under observation at various sanatoria in Switzerland; 70 per cent of these died within two years and of the 98 survivors, 68 still suffered from urinary tuberculosis, while only 30 per cent had been relieved of their symptoms. In 16 of these the clinical cure had persisted for over five years, but after years of apparent cure sudden breakdown and death were known to have occurred."

In view of this, efforts at cure or control by the use of tuberculin become the height of unfairness to the operable, and of little value to those on whom operation is not possible. If tuberculin has any real value in this disease manifestation, it is a postoperative one, never a preoperative.

There are, of course, patients in whom operation should not or cannot be done. For, like most operations, this one has its contraindications and no one has stated these more briefly and clearly than has Keyes, in the following manner:

"1. Any general condition contraindicating a major operation.

"2. Active tuberculosis elsewhere in the body as to contraindicate a major operation. This includes almost all cases of active pulmonary tuberculosis.

"3. Tuberculosis of the opposite kidney so far advanced as to impair its phenolsulphonaphthalein elimination below 30 per cent, per half hour, after intravenous injection.

"4. Any lesion, congenital or acquired, markedly reducing function of the opposite kidney.

"5. Marked tuberculous nephritis of the opposite kidney or tuberculous myocarditis sufficient to make the pulse persistently rapid are warning signs but not contraindications to operation."

Those patients who cannot be operated upon, and those who have persistent vesical symptoms after operation, become an office or home problem of no mean proportions to the practitioner. They are among his greatest sufferers because of atrocious vesical symptoms that tax his skill to relieve. The forms of treatment that have been of the greatest value to the writer will be found under the heading of Vesical Tuberculosis. Aside from the vesical symptoms, such patients usually offer only those treatment indications common to other forms of tuberculosis, for renal symptoms are rarely prominent.

#### RENAL CARBUNCLE

Renal carbuncle has been so named in view of the fact that the lesion not only resembles skin carbuncle but very commonly is secondary to it. Almost invariably, it is preceded by some skin infection such as carbuncle, boil, paronychia and the like. Being due to the hematogenous transference of staphylococci from the primary focus, a septic infarct, it likewise has been called septic infarct of the kidney. Of late years, the term carbuncle

<sup>1</sup>Keyes, E. L.: *Urology*, D. Appleton-Century Company, New York, 1928.

has been so generally used for the lesion in urologic circles that it perhaps, is better to accept that designation than to try to overcome the trend by the substitution of a better term

Renal carbuncle is more common in males than in females and hardly ever occurs in children. At least none of the reported cases were in children who show a predisposition to develop osteomyelitis from such infective infarcts in contradistinction to the renal involvement in adults. In only a few of the cases reported has there been a bilateral involvement.

Occasionally, the development of carbuncle of the kidney seems to be favored by renal trauma or renal back pressure though most of the cases



Fig. 238—Multiple carbuncles of the kidney. (Courtesy of Dr. Hanman, *Principles and Practice of Urology*, W. B. Saunders Co., Philadelphia.)

have shown neither. The time elapsing between the development of the primary skin infection and that in the kidney is usually more than two weeks and may be a month or more. So fixed is the association between the two lesions, however, that carbuncle should be suspected in every patient experiencing suggestive symptoms within three months of having had a staphylococcal skin infection. The same also, might be said regarding sore throat and influenza, for cases following both of these have been reported.

**Pathology**—The renal lesion resembles a true carbuncle in that it is



a circumscribed area of new formation containing a number of purulent centers. It may occur in any portion of the renal cortex. Rarely does it penetrate deeply enough into the kidney structure to reach the pelvis. Almost invariably, it points toward the renal capsule, through which it often breaks to cause a perinephric abscess. It, thus, should be suspected wherever a perinephric abscess occurs in the absence of trauma.

Being a circumscribed area walled off from the deeper portions of the kidney by a thick barrier of round-cell infiltration, it pours none of its purulent products into the urine, as do the more common septic infections of the renal substance. Thus, it lacks the urinary picture so suggestive of most renal infections, for which reason it is prone to mislead the clinician.

**Symptoms.**—Most cases of carbuncle start with a definite chill, an elevation of temperature and a corresponding acceleration of pulse rate. A few, however, lack this more dramatic onset; starting more gradually, they direct attention to the renal region only when they produce pain or after they have caused a perinephric abscess. In the vast majority, fortunately, pain in the renal region is an early and annoying symptom. Usually, there is tenderness in the costovertebral angle, particularly on ballottement. Though the kidney may be enlarged slightly, it rarely is palpable until late in the condition. Leukocytes may range from 9,000 to 30,000 or more. Generally the patient is acutely sick, showing the usual picture of septic absorption (septic temperature, gastro-intestinal upset, prostration, dry tongue and the like).

Unless there has been other preceding urogenital infection, the urine shows nothing but a faint trace of albumin and, perhaps, a few red cells. In fact, it is the presence of an almost microscopically normal urine that commonly does so much to direct attention away from the urogenital tract.

Where differential renal function tests have been carried out there has been demonstrated a marked retardation of phthalein appearance time and a decided reduction in output on the affected side.

**Diagnosis.**—The outstanding diagnostic points rest in the history of a recent skin infection and the sudden or gradual onset of septic symptoms associated with pain or discomfort in the renal region, tenderness in the costovertebral angle, perhaps enlargement of the kidney, and a practically normal urine. Where pyelographic studies have been carried out there generally has been a failure of one or more minor calices to fill with the pyelographic medium, due to the pressure from the round-cell barrier, as well as to the intracapsular tension from the suppurating area. The aforementioned change in renal function between the two kidneys would be of value. One, however, should not advise these procedures as a routine upon patients so acutely sick as many of these cases are. In the more ingravescent types they would not be so signally contraindicated.

As a matter of fact, the real diagnosis usually is made at operation, at times at autopsy. It usually is possible to decide, however, that such a patient has a renal lesion demanding surgical intervention. So true is this, that most of the reported cases had received exploratory operations. Upon some of the cases a correct preoperative diagnosis was made. Care should be taken not to be misled by the occurrence of pain on deep breathing in some patients. For there are those in whom one could be tempted into a diagnosis of pleurisy.

**Treatment**—The sole treatment of fulminating renal carbuncle is prompt surgical intervention. For while it is possible that a few of the milder cases have recovered spontaneously, it is noteworthy that most will die if surgery is withheld. So fraught with danger is the lesion that one should have little hesitancy about advising an exploratory operation in any patient presenting highly suggestive symptoms and a suggestive historic background.

In the milder cases of staphylococcic cortical abscess not associated with perirenal infection resolution rather commonly takes place. Thus if these milder cases show definite signs of improvement one often is justified in taking an attitude of watchful waiting. He should not hesitate however to urge operative measures if there is any change for the worse in the patient's condition. It is probable that urinary antiseptics would be of little value in such a walled off condition. Certainly this being a staphylococcic infection sulfanilamide has little to offer. The proved value of sulfathiazole in staphylococcic infections would indicate its use but it should not be relied upon unless it *is* caused a marked improvement in all symptoms within seventy-two hours.

#### RENAL CALCULUS

Despite the most careful and extensive investigations into the several factors underlying stone formation in the urinary tract we are far from being in accord regarding them. However it is safe to say that at no time have these factors been analyzed more carefully than has been done within

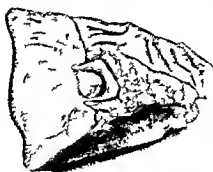


Fig. 239. A calcareous plaque of the renal papilla. (Courtesy of Dr. Paul R. Leberman.)

the last few years. Out of this seemingly endless amount of study have come a number of things that yet may lead us to the answer. Unquestionably the most noteworthy recent work is that of Randall whose penchant for going to the autopsy table for the answer to things that puzzle has brought a reward of the most striking proportions. Observing that stones from a calyx had a smooth surface suggesting mucous membrane attachment he started a minute study of the pyramid tips of kidneys freshly removed at autopsy. In a remarkably short time he collected several kid-

neys that showed definite lesions in the apices of one or more pyramids. Macroscopically, these areas appeared as whitish plaques to which, at times, were attached minute concretions. Upon microscopic study it was

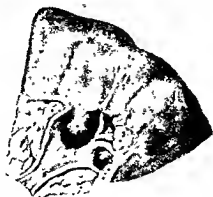


Fig. 240.—Close inspection will reveal a small calcarous plaque at the cut surface of the pyramid tip and a small cinder-like concretion attached to its side. (Courtesy of Dr. Paul R. Leberman.)

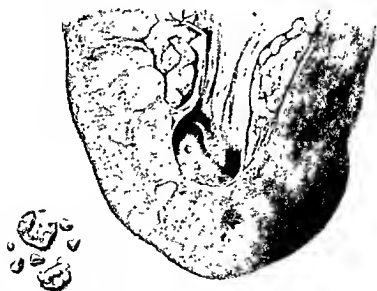


Fig. 241.—Calcarous plaques (Randall) of the renal pyramid with two small calculi still attached. At the side are some calculi that were incarcerated in the corresponding calix. (Courtesy of Dr. Paul R. Leberman.)

shown that there were subepithelial and extratubular deposits of calcium. The more advanced lesions showed an absence of the epithelial layer, so that the calcium surface was exposed to urine from the still existing tubules. Upon this exposed calcium surface were deposited urinary salts differing in

chemistry as the urine was supersaturated with one substance or another, calcium carbonate and calcium oxalate often being superimposed one layer upon another. There was no obtainable evidence that infection plays any direct part in the process.

After a most exhaustive study, he is convinced that these are the lesions in which renal stones originate. Having reached this point, however, he does not consider that the question of stone formation is by any means answered. Like most discoveries of the kind, it opens up an almost endless field for research beyond that already existing regarding the true processes involved in stone formation.

So many and varied are the theories that have been advanced to explain calculus formation in the urinary tract that it would require much space to enumerate them, and a prohibitive amount to discuss them. Unques-



Fig. 24<sup>7</sup>—Calculi in the cortical portion of the kidney (Department of Pathology University of Pennsylvania)

tionably, there are a great number of poorly understood factors underlying this phenomenon. With so many investigators interested in the subject, it is probable that the next few years will change entirely many of our former views upon the subject of stone formation. Certainly, today the entire matter is in such a state of flux as to justify one in omitting a further discussion upon etiology. We do know that stasis of any type, either here or in the bladder, favors stone formation in certain individuals, but, in most individuals having marked urinary stasis, no calculi are formed. It has also been shown that there is a relation between hyperparathyroidism, certain types of avitaminosis, and stone formations. But even yet we do not know the true reason for the colloid imbalance that seems to play so important a part.

**Pathology**—Other than the many poorly understood factors underlying

stone formation, the pathology of the condition well may be considered as the changes secondary to the presence of the stone itself. The frequency with which large stones of the kidney pelvis, that produced no symptoms calling attention to themselves, have been found at autopsy or by x-ray study for other conditions, has been commented upon by most observers. In many cases these stones not only have been large stag-horn calculi filling pelvis and calices alike but they also have been bilateral. Often, the kidneys themselves have been damaged to such an extent as to produce a true uremia without even a suspicion of calculus having arisen.

Infection, of course, happens with such marked frequency in the presence of pelvic calculi as to lead to their discovery by the studies suggested



Fig. 243.—Nephrolithiasis with hydronephrotic distention. (Department of Pathology, University of Pennsylvania.)

for the cause of the pyuria. The same can be said of the hematuria that not infrequently accompanies such stones.

Such a degree of possible symptomatic silence does not in any sense apply to those smaller stones that fail to find such a comfortable resting place in the kidney pelvis but succeed in passing into, or through, the ureteropelvic opening. With them, the pathology is of the more acute type, as a rule. Prolonged lodgment of a stone at this point or below results in dilatation of the kidney pelvis, the ureter above the point of obstruction and, perhaps, the major or minor calices. Indeed, this dilatation eventually may cause almost any grade of hydronephrosis or, if infection takes place, a pyonephrosis. Very little true kidney structure may remain

If on the other hand the obstruction is relieved within a reasonable length of time the kidney usually regains much or all of its former functional capacity. The condition early is usually unilateral but in long standing renal calculus the second kidney becomes involved in over half of the cases.

**Symptoms.**—As has been said *pelvic stone may cause no symptoms and be found at autopsy or in studies for other things*. On the other hand there may be large stones that cause only vesical symptoms due to cystitis secondary to infection in the renal pelvis. In over two thirds of the cases of large pelvic stones that do not occlude the ureteropelvic junction in



Fig. 244.—Nephrectomy specimen with almost complete destruction of the kidney and showing calcium oxalate stones in situ. (Department of Pathology, University of Pennsylvania.)

efforts to descend there is pain in the corresponding costovertebral angle. At times there is pain anteriorly also so that the patient in describing the location of his pain places the fingers of the corresponding hand at the anterior rib margin and the thumb at the costovertebral space.

The pain of renal calculus may be constant, periodic or referred. Constant pain more often is of the dull aching type in the renal region. It commonly is increased by jarring of any type and usually is somewhat relieved by assuming a recumbent posture. The larger and more fixed the stones the less acute are the pains they cause as a rule. Smaller stones which from time to time can block the ureteropelvic outlet are fre-

quently associated with marked seizures of prolonged, renal pain. Stones fixed in a renal calix rarely cause pain.

Microscopic blood probably is present in the urine at some time in every case of renal or ureteral stone. Following attacks of ureteral colic, macroscopic *hematuria* is almost the rule. Hematuria may be the only symptom and may cause ureteral colic when clots pass through that canal.

*Pyuria* is common in renal stone but is not in any sense the rule. It may disappear temporarily during the attack of ureteral colic, owing to the occlusion of the ureteral lumen, to reappear on the passage or removal of the stone. Under such circumstances, there almost always is an elevation of temperature as the result of pus under tension in the upper ureter and kidney pelvis. The temperature speedily drops to normal when drainage



Fig. 245.—Branched calculi filling the major and minor calices of the kidney. (Department of Pathology, University of Pennsylvania.)

is established either by the introduction of a ureteral catheter or the passage of the stone into the bladder. Under other conditions temperature elevation is a rarity.

*Urinary suppression* may take place upon rare occasions. Such an event generally denotes that both ureters are completely blocked. This, however, is not always so, as not a few cases have been observed in which there was a renorenal secretory reflex wherein the unaffected kidney stopped its output of urine during the passage of stone down the opposite ureter.

In many cases of renal stone in the absence of infection, and in most cases where there is renal and pelvic infection, *frequency of urination* is present. In not a few cases the studies for the cause of the frequency are the ones that reveal the presence of unsuspected stone. During an attack of ureteral colic there often is a marked frequency, though the amount of

urine passed is small. This frequency generally is increased after the ureteral block is relieved, but here much more urine is passed. Indeed, the frequency then often is due to an increased output of urine.

**Diagnosis**—The exact diagnosis of stone in the kidney, which gives no such characteristic symptoms as does a stone passing along the ureter, depends mostly upon roentgenologic studies and is considered under that section. The suggestive symptoms previously mentioned should lead to such studies more often than is at present the case. For it is rare for stones to remain in the kidney pelvis for any great length of time without doing considerable damage to the kidney.

Rarely do palpation or inspection aid in such a diagnosis. For this reason it is an excellent rule to make, that no patient having renal pain, pyuria or hematuria should be denied x-ray or cystoscopic study.

**Treatment**—In the present state of our knowledge it is justifiable to see what dietary or medically obtained urinary acidification may do toward its reduction in size or solution. This is particularly true if the stone is small or if it is large but casts a light roentgenographic shadow. Lower and Higgins have reported the disappearance of pelvic stones as the result of the acid ash diet. And, as stated elsewhere, the writer has seen urinary acidification with ammonium chloride dissolve large fragments of calculi left in the bladder after crushing. Crowell, some years ago, reported the entire disappearance of a cystine stone from the renal pelvis by the same urinary acidification. If either of these methods is employed it should be checked roentgenologically at intervals and, if there is no change within a reasonable time, it should be discontinued.

In the presence of stone seemingly small enough to enter the ureter, and which has resisted the above treatment, a prolonged period of waiting is justifiable. If, however, it produces marked symptoms or shows evidence of increase in size, it should be removed by surgical means if there are no marked contraindications. Stones of increasing size eventually bring about much destruction of renal tissue and it is unwise to leave them in the kidney pelvis.

The advisability of operating upon large bilateral stones is often a surgical problem requiring for its safe solution much seasoned judgment. Not only must one determine which side should be operated upon first, but he must also determine whether or not the patient would have a better chance without any operation. For many patients with large bilateral calculi have such a low renal function as to add a definite hazard to operative intervention. The removal of stones from even badly damaged kidneys frequently eventuates in a marked increase in functional value of the kidney operated upon. This fact should be borne in mind as giving definite value to operation upon many apparently poor surgical risks.

One well might summarize the matter by saying that every patient with a pelvic stone too large for passage through the ureter should have the stone removed if its removal is not fraught with too great danger by virtue of the fact that he is not deemed physically capable of withstanding the operation.

Under some circumstances there may be value in efforts toward dissolving stones in the renal pelvis. As a rule, such efforts are highly disappointing but within the last few years there have been enough successes



along this line to justify a trial. The writer has seen two cases wherein many large fragments of stones, left in the bladder because further effort toward their removal was more dangerous than were the stones, entirely dissolved when the alkaline urine was converted into a highly acid one. Not a few pelvic stones are rather loose in texture and, theoretically at least, should lend themselves to such treatment. Thus, in the presence of an alkaline urine one rarely harms the patient by an acid-ash diet or those medicaments aimed at urinary acidification previously discussed.

If the stone is removed surgically, an effort should be made to determine the cause of the stone formation and such dietary or other measures as may be indicated should be instituted to discourage their recurrence or further increase in the size of the remaining stones, where removal has not been possible. Lower and his associates greatly extol the virtues of an acid-ash diet in some cases. Chute and Barney urge studies aimed at the discovery of hyperparathyroidism and operation upon these glands if it exists. Those who see stone formation as due to some type of avitaminosis urge the administration of the lacking vitamins. Others, as has been said, see much value in a more marked reversal of the hydrogen-ion concentration of the urine than is likely to be obtained by simple changes in diet and resort to the medicaments generally used for such purposes. (See Urinary Acidification.)

#### RENAL NEOPLASM

Equaling, if not exceeding testicular new growths in the matter of their deadly potentialities, neoplasms of the kidney present a clinical problem of the greatest importance. Like the former, they usually require early recognition and prompt therapeutic activity if life is to be saved. No matter what may be their histologic characteristics, they all must be considered malignant, or potentially so, and removed wherever possible. Even if at operation they are deemed benign, it usually is advisable to do a nephrectomy if possible, for even these show a marked tendency to undergo a malignant change.

So few renal neoplasms are of uniform structure that one does not do well to be guided by frozen sections of small portions of the growth. With the exception of small fibromata, fibromyomata and the far rarer hemangiomata and lymphangiomata, no half-way measures are safe in any type of renal neoplasm.

**Pathology.**—New growths may spring from any portion of the renal and pelvic structures, singly or collectively. The mixed types of many such new growths have occasioned the most confusing of classifications, in which there is little uniformity. In early life, the most common variety of tumor is the so-called Wilms' tumor, composed of a large assortment of differing cell groups evidencing their multiple-layer origin and placing them well within the teratoid group. They grow rapidly, reach enormous size and do not show the early tendency to metastasize as is so common to the adult tumors. They exhibit striped and unstriped muscle, cartilage, glandular and epithelial tissue, with a predominance of mesenchymal elements. Much of the confusion regarding these tumors is due to the fact that some areas may be typically sarcomatous, while others are carcinomatous or adenocarcinomatous.



Fig. 246—Hypernephroma involving the lower half of a kidney (Department of Pathology, University of Pennsylvania.)



Fig. 247—Small hypernephroma in the upper pole of the kidney (Department of Pathology, University of Pennsylvania.)

In adult life, the most common renal new growths are of the hypernephromatous variety. Even this designation is somewhat of a misnomer, in that it implies that they all spring from the adrenal gland or from adrenal cell rests in the kidney itself. Regarding such points of origin there has been much discussion since the work of Grawitz, whose name has been given to the tumors. The present tendency is to discard such an origin, and to regard the resemblance of some portions of the tumor to adrenal structure merely as an evidence of varied structure, for, like testicular teratomata, they may show almost any type of cells and cell arrangement.

Renal hypernephromata vary from the typical Grawitz tumor, an encapsulated, yellowish, usually subcapsular, rounded growth of small or moderate size, to the far more malignant growths that often reach great size



Fig. 248.—A Wilms' tumor of the kidney from a child three years of age. (Drawn by courtesy of Dr. Frank Konzelmann.)

and show a tendency to replace most or all of the true kidney structure. These latter frequently grow into the kidney pelvis and renal vein, and often penetrate the kidney capsule itself and grow into the perirenal tissues. Early metastases into the bones, lungs and liver are common.

Papillomata and papillary carcinomata of the renal pelvis are by no means so rare as formerly was supposed. These, together with the far rarer solid or squamous growths, differ very little in importance to the patient. The former are potentially malignant and the others are already so. The papillary types of tumor may fill the kidney pelvis entirely and show a definite tendency to extend along the ureter and into the bladder. They differ little from the same types of growth found in the bladder.

Symptoms.—In childhood, renal neoplasm is singularly devoid of lead-

ing symptoms. Neither pain nor hematuria are common, and the condition usually is discovered because the mother, or caretaker, has noticed either an abdominal mass or swelling. Late in the disease, there may be pain from pressure within or without the kidney. In the very young, this interprets itself into irritability. In the few cases where hematuria does



Fig. 249—Carcinoma of the renal pelvis with secondary involvement of the lower ureter causing back pressure hydro ureter and hydronephrosis. (Drawn by courtesy of Dr. Frank Konzelmann.)

occur, attention may be called to the neoplasm in that way. It is rare, indeed, for a diagnosis to be made in the early stages, the growth having attained great proportions as a rule, before it is discovered.

In the adult, renal neoplasm more often shows early symptoms suggesting renal pathology. The most frequent of these is hematuria, which may be of almost any degree. This fact again, is one of the strongest argu-

ments for the closest study of every patient in whose urine blood is encountered. Hemorrhage into the kidney pelvis rarely occurs until the growth has broken into that structure, and the promptness with which this occurs is, naturally, dependent upon the location and activity of the growth. In the presence of intrapelvic growth, hematuria usually is a much earlier symptom.

Pain, the next most common symptom, may be due to a number of causes. It may be the dull pain of intrarenal pressure. It may be the nerve pain of extrarenal extension or it may be an acute ureteral colic from the passage of clots along the ureter.

In the presence of extensive growths, cachexia may be the first symptom to suggest neoplasm. Recently-occurring varicose is highly suggestive.

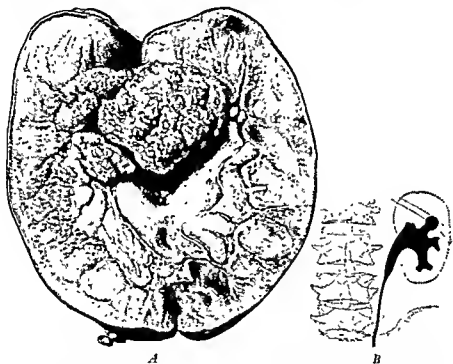


Fig. 250.—Large papillomatous growths in the renal pelvis and a blocked outline of the pyelography shadow. (Herman, *The Practice of Urology*, W. B. Saunders Co., Philadelphia.)

Tumor, though always present, often cannot be made out by palpation until the growth has assumed great dimensions. Particularly is this so if its point of origin is in the upper pole of the kidney.

Diagnosis.—The diagnosis rests upon the suggestive symptoms, palpation, often the cystoscopic findings and the roentgenographic study. Of the group, it is probable that the last is of most importance. For, as a rule, a renal tumor will so distort the normal picture of a retrograde pyelogram as to offer rather conclusive evidence of its presence. Even with small intrapelvic growths a filling defect usually can be seen in the pelvic shadow.

Not so much value accrues from intravenous pyelography in renal tu-

mor, as a rule. The greatly lessened output of the diseased kidney may give suggestive data but the pelvic shadow is seldom sufficiently clear-cut for a safe conclusion. Intravenous pyelography finds its greatest value in differential diagnosis in those cases of abdominal mass wherein doubts exist. Particularly is this true in children, where it is not always a simple matter to assure oneself that a given tumor is truly renal.

**Treatment**—Obviously, the treatment of renal neoplasm is surgery, but present belief is veering to the point of using preliminary irradiation. While this has no marked influence upon intrapelvic growths it commonly will reduce the size of renal neoplasms to such an extent that surgery is far less difficult and immeasurably more satisfactory. It is however obvious that one cannot rely upon irradiation alone for the usual mixed type of renal neoplasm contains definitely radioresistant portions of malignancy. Thus reduction in size following irradiation is due to its action upon only the radiosensitive portions and to leave the kidney is to leave the more resistant portions of the neoplasm and, almost certainly, to lose the patient by death.

### RENAL INJURY

Aside from war inflicted wounds injury to the kidney substance most commonly is due to force applied to the external surface of the body. This

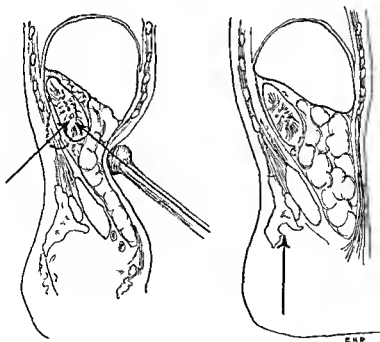


Fig. 251. Diagrams to show the directions of forces that may rupture the kidney (After Papin)

may be either from a blow, fall or crushing force. It is not always necessary that the force of the injury be applied near the kidney, as there have been a number of cases reported of kidney rupture as the result of falls, the force of which did not touch the area around the kidney, such as a

fall on the buttocks. Also, the kidney may be ruptured by the passage of a bullet or sharp object through it. Rarely does spontaneous rupture occur.

The injury of the kidney may be but the slightest break in renal substance, or it may be so great as almost to pulpify the organ. And the resulting symptoms vary, as a rule, with the extent of the injury and the amount of blood lost. The direction taken by the blood is dependent upon the position of the renal break and upon this direction depend, to a great extent, the clinical manifestations.

**Symptoms.**—In over 90 per cent of the cases of kidney rupture hematuria is a prominent symptom. If, however, the break is entirely cortical,

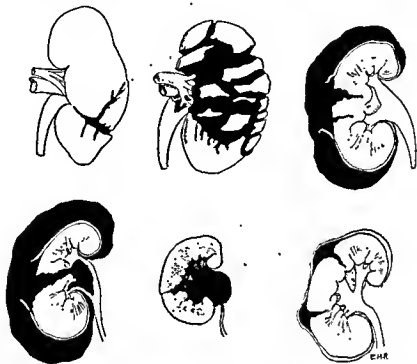


Fig. 252.—Diagram to illustrate the varying types of rupture of the kidney. (After Papin.)

this may be absent or only of microscopic quantity. Blood in the urine, also, may be absent if there is a block from blood clot or the ureter is entirely severed. Hematuria may be the first sign of renal damage or it may be delayed until long after injury. It may be profuse and continuous or scanty and intermittent. There may be true ureteral colic from efforts to pass blood clot. Usually there is steady pain in the renal region.

Added to these symptoms are those of immediate or delayed shock, which, in severe injury, may be profound, even fatal. If hemorrhage is severe, there occur the classical symptoms of internal bleeding, which so closely may imitate those of shock that confusion is possible. There is steadily increasing pallor, craving for water, increased pulse rate with diminishing pulse volume, cold, clammy skin and extreme restlessness.

If there is bleeding into the perinephric space, loin pain and tumefac-

tion appear with lumbar rigidity and pain in the upper abdomen. Should the blood escape into the peritoneal cavity there develop besides the symptoms of internal bleeding the signs of peritoneal irritation and abdominal distention with muscular rigidity. If infection supervenes there are added the characteristic temperature changes and other suggestive evidences.

**Diagnosis**—The history of an injury, pain in the renal region, shock (usually mild) hematuria (in over 75 per cent of cases) should arouse suspicion of renal injury. These in the severe cases are likely to be associated with the symptoms of internal hemorrhage and at times there are both peritoneal irritation and swelling in the flank from perinephric bleedings.

Perhaps the best means by which renal injury can be demonstrated particularly if the cortex is broken is by secretory urography. In such



*Fig. 233—Rupture of the kidney with large intracapsular blood-clot (Drawn by courtesy of Dr. Frank Konzelmann)*

cases it frequently is possible to demonstrate the escape of the radiopaque medium into the surrounding tissues. Rupture of the kidney has been shown by a number of workers through the employment of retrograde urography. The dangers from this procedure however are such as to command great caution in its use if indeed there is true justification for it.

Cystoscopy may be of use in the milder cases in revealing the side from which the hematuria originates. On the other hand there just as often is no real need for it. Usually one is not in the least doubt about which kidney is in difficulties.

**Treatment**—The treatment of renal rupture depends entirely upon the gravity of the case. In the milder cases an expectant plan of treatment is indicated. Absolute rest with perhaps ice bags to the renal region or upper abdominal quadrant may be all that is necessary. The writer has



had good results in the checking of minor renal hemorrhage in such cases from the daily intravenous injection of 10 c.c. of 10 per cent calcium gluconate solution. The tendency for such bleeding to recur should be recognized and the patient should be restrained from great activity for weeks after he becomes ambulatory.

The presence of marked, increasing perirenal hemorrhage, as well as abdominal hemorrhage, demands immediate operative intervention. This is also the case where infection has taken place. Operation should be considered in the presence of continued or recurrent bleeding into the pelvis whenever the bleeding is of such a nature as to produce anemia.

Where a palliative course has been pursued with seeming success it is well to make a study of the comparative functional values of the two kidneys a year or so after recovery, for later complete cessation of function in the injured kidney is not altogether rare.

#### MOVABLE KIDNEY

Ptosis of the kidney of one degree or another has been found to be a common condition in women, far less so in men. Its incidence in the former being about 20 per cent, as against 1 per cent in the latter. Also, in women the right kidney is the offending member in at least 70 per cent of the cases, whereas in the male, there is no greater incidence in one than in the other.

The older idea that nephroptosis was usually associated with visceroptosis is no longer tenable in view of the more recent studies which place it at about 10 per cent. It is probable, however, that the older view was not so greatly in error at the time it was voiced. The modern woman presents a far better abdominal wall musculature than did her grandmother, who splinted hers with corsets and gave it little opportunity for real development.

Normally, the kidneys move slightly downward on inspiration, particularly the right one. In true nephroptosis, however, the organ may descend a few inches or it may go even as far as the bony pelvis in extreme cases. At times, the organ falls forward, carrying peritoneum with it, and becomes what has been called the "floating kidney."

While excessive mobility of the kidney, of itself, is not a matter of grave moment, such a kidney, through traction on its own blood supply or interference with the proper function of the ureter, may constitute a decided menace to the individual. Not only may the kidney undergo a gradual and complete cessation of function from hydronephrosis due to ureteral kink, and angulation due to blood vessels or fibrous bands, but through sudden blockage, perhaps infection, it may occasion acute and dangerous crises.

Most cases of nephroptosis, particularly those of the lesser grades, present no symptoms, no other pathologic changes, and no emergencies. This fact, together with the former rather frequent failure of operative procedures to really retain the kidney in its normal position, led to the old clinical dictum that, "he who informed a patient that she had a movable kidney was starting troubles for the patient and himself." Despite the better operative results of today the truth of this older view still holds in many cases.

**Etiology**—So many reasons have been given for the occurrence of nephroptosis that one finds it impossible to narrow them down to one that really explains. Rather generally it is held that shallowness of the renal fossa is the commonest predisposing cause. That this is so seems rather well borne out by the fact that in the female the right renal fossa is noticeably shallower than the left and in 70 per cent of the cases it is the right one that is misplaced.

Body form of itself also seems to play a definite part in the development of nephroptosis. Keyes quotes Cabot and Browne to the effect that a dropping flat chested round shouldered attitude compresses the lower ribs and is the occasion of many cases of renal mobility. He also quotes Harris as stating that the characteristic predisposing body forms are a marked contraction of the middle zone of the body with a diminution in the capacity of this portion of the body cavity. This diminution in capac-

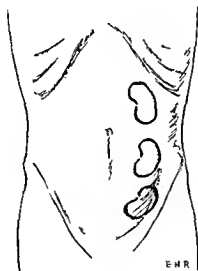


Fig 254 Grades 1 2 and 3 of renal ptosis

ity of the middle zone depresses the kidney so that the constricted outlet of the zone comes above the center of the organ and all acts, such as coughing straining lifting flexions of the body etc which tend to adduct the lower ribs press the upper pole of the kidney and crowd it still farther downward. It is long continued repetition in a suitable body form of these influences which collectively may be called internal trauma that gradually produces a movable kidney.

Flabbiness of the abdominal wall emaciation and a lessened quantity of supporting fat in the renal fossa likewise make the development of excessive renal mobility more prone to occur.

Added to the above predisposing conditions are a number of things of an active nature that tend to precipitate nephroptosis such as jolting direct trauma to the renal region and things of a like nature.

**Pathology**—Just what happens in the kidney depends upon what its mobility does to its circulation or its ureteral drainage. Hydronephrosis

of varying grades is common in those kidneys with a wide range of mobility. Circulatory embarrassment may bring about renal atrophy, and complete torsion of the pedicle with gangrene of the kidney has been reported.

**Symptoms.**—About four-fifths of all patients with nephroptosis are entirely free from symptoms. Hinman says that 20 out of every 100 women have excessive renal mobility and only 4 of these 20 have symptoms. Many of those patients who do have symptoms have no definite renal ones, but have symptoms largely referable to the gastro-intestinal tract, and not infrequently there is reason for these elsewhere than in the kidney. Some of these individuals are of a distinctly neurotic type, particularly if they are aware of the movable kidney, and they present a baffling assortment of symptoms that could mean almost anything and yet are largely psychogenic.

There are, however, patients who do have symptoms directly referable to the kidney. Particularly is this true of those who have any ureteral block. In them there may be a dull, heavy ache in the loin or in front over the kidney area. Such pain may be continuous or intermittent and may even be in the lower loin or hip. Rarely does it radiate. There may be a true Dietl's crisis at widely separated intervals.

If there is an infected hydronephrosis, fever may be a symptom during the period of ureteral closure. Following such attacks, pyuria and possible secondary cystitis are common.

**Diagnosis.**—The diagnosis of nephroptosis rests with the urogram and the possible palpation of the kidney. In view of the fact that even the symptomless cases, at times, show evidences of interference with the proper emptying of the renal pelvis, it is safe to say that every patient in whom a movable kidney is felt or suspected should be subjected to urographic study. It is only by such an investigation that one can differentiate safely between those patients who should have a nephropexy and those who should not.

**Treatment.**—The treatment depends solely upon the symptoms, and the urographic and other findings. It is recognized that it is not always the wisest plan to tell the symptomless patient of the presence of a movable kidney. As a rule, one can even carry out the proper x-ray studies without talking about the kidney, now that the intravenous urogram is often so revealing a thing. It easily can be made a part of a routine study, and it is better that it be done than to overlook conditions that eventually may lead to renal destruction.

The application of an abdominal support and attention to the posture and nutrition may be all that is needed in some patients. Particularly is this so with those who have an associated visceroptosis, wherein operative procedures on the kidneys do not so signally remove the symptoms of which the patient so often complains.

In the presence of hydronephrosis, infected hydronephrosis, Dietl's crises, and painful symptoms directly due to the nephroptosis, nephropexy should be done.

#### POLYCYSTIC KIDNEY

This congenital, sometimes hereditary, anomaly of the kidney is characterized by the formation of large numbers of cysts of various sizes. These, macroscopically, often seem to compose the entire kidney substance, though

microscopically more or less functioning substance is seen between the cysts

Polycystic disease of the kidney is practically always bilateral although the condition may be more marked in one kidney than in its fellow. Kidneys of this type have been reported to be so large at birth as to interfere with delivery. Many of the victims die shortly after birth or during early childhood as the result of renal dysfunction. Many cases however reach adult life and some are well on in years before the lessening renal function makes serious inroads upon health. About 25 per cent of the patients present cysts of the liver. To some extent the disease is hereditary being rather common in several members of the same family.

Pathology—The gross pathology of cystic disease of the kidney is such that doubts rarely arise. The organ is large and its surface is markedly



Fig. 255—Gross and cut surface of polycystic disease of the kidney.

irregular. Upon section it seemingly is solely a mass of cysts the contents of which vary from a clear limpid fluid to a caseous material. Although cysts occasionally rupture into the renal calices or pelvis they ordinarily have no direct connection with either.

Microscopic sections show the cysts lined by a low cuboidal type of epithelium on a thin fibrous wall. Between the cysts are seen true renal structure showing varying grades of change from pressure. Calculus formation is rare and hemorrhagic areas are common.

Symptoms—The presenting symptoms are usually those resulting from failing renal function. Renal pain as the result of subcapsular hemorrhage, is not uncommon. Hematuria from time to time occurs in some cases and there may be true ureteral colic from efforts to pass a blood clot. At times the discovery of an abdominal mass gives the first inkling of trouble.

Diagnosis—Of late years the diagnosis largely has rested upon the x ray

findings of large, often irregular renal shadows and a rather characteristic urogram in which the calices are thin and greatly elongated. Pycelography rarely reveals a normal shadow. Usually, suspicion is first aroused by the remarkable distance between the upper and lower calices and the fact that the condition is bilateral.

In some patients with thin-walled abdomens a large irregular kidney can be palpated, occasionally both kidneys. In children this more commonly is the case.

These findings, together with the bilaterally reduced renal function and the systemic changes common thereto, seldom leave one in doubt.

**Treatment.**—Except for the rare emergency of seemingly dangerous bleeding, and the slightly more common one of pelvic block, the treatment is entirely medical. It is that of any other patient with failing kidney function.

#### HORSESHOE KIDNEY

It has been said by various writers that this interesting renal anomaly occurs in about 1 in every 600 individuals. Prior to the advent of urography the diagnosis was usually made at operation or autopsy. However, since this diagnostic procedure has come into such general use preoperative diagnosis is of frequent occurrence.

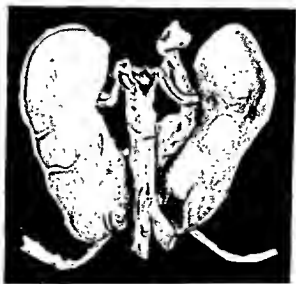


Fig. 236.—Posterior aspect of a horseshoe kidney. (Department of Pathology, University of Pennsylvania.)

In the vast majority of cases the kidneys are joined at their lower poles either by a broad fibrous band or true kidney structure. In about 10 per cent of the cases the upper poles are joined. The joined organs almost invariably lie much lower in the abdomen than is usual for normal kidneys. The two sides are not always of equal volume and usually are not on the same level. Upon extremely rare occasions the connecting portion may lie behind the abdominal aorta and the vena cava. Usually, one segment and, often, both segments are incompletely rotated. This lack of rotation

is the thing that most commonly aids in the roentgenologic discovery of the condition as it causes the shadows of the major calices to be directed inward toward the spine instead of outward in their normal directions

Being in abnormal positions with their arteries and ureters in close contact it is common for pathologic conditions to occur in one or both segments. Among the most common complicating lesions are hydronephrosis, pyonephrosis, calculus disease and tuberculosis.

**Symptoms**—Years ago Rovsing described a set of symptoms common to this anomaly which has been known as the Rovsing syndrome. These symptoms are really pressure symptoms occasioned by the impingement of the isthmus upon nerves and vessels. There is upper abdominal pain par-

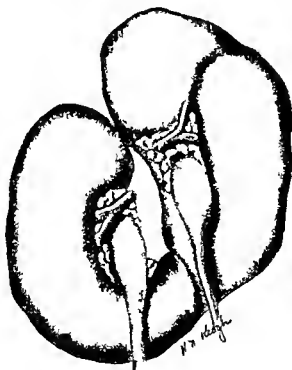


Fig. 257—Horseshoe kidney (Drawn by courtesy of Dr. Frank Konzelmann)

ticularly upon arising from bed or a chair. Often the pain is present both in the sitting and standing positions. In some cases the patient leans forward when in the upright position in order to relieve the pressure. Bending backward or heavy lifting commonly increase the pain greatly. Occasionally the pain is increased by eating.

To these symptoms associated pathology may add others more or less characteristic of their symptoms in organs not anomalous.

**Diagnosis**—The diagnosis rests in the suggestive symptoms, often the palpation of the misplaced organs with a median isthmus and pyelographic study. As has been stated above, the pointing inward of the calices of one or both segments is practically pathognomonic.

**Treatment.**—Where diagnosis has been made in patients having no symptoms, no treatment is required. In the presence of pain or demonstrated pathology operation is indicated.

### CYSTS OF THE KIDNEY

Small cysts of the kidney are in no manner of speaking rare findings both at operation and at autopsy, and are of no particular importance to the patients. Upon far rarer occasions, renal cysts grow to enormous proportions and produce decidedly distressing symptoms. The larger cysts are more common in the female and, for some unknown reason, involve the right kidney more often than the left. They usually contain a clear fluid or the fluid may be bloody. Rarely, their walls undergo a calcareous change which makes roentgenologic diagnosis possible without resort to

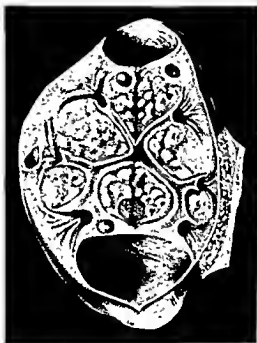


Fig. 258.—Cysts in the upper and lower poles of a hypoplastic kidney, with much fatty replacement. (Courtesy of Dr. Frank Konzelmann.)

pyelographic studies. There may be one or several cysts. With extreme rarity, the cysts are multilocular. Renal cysts are rare in childhood, occurring usually between the ages of thirty and sixty years.

**Symptoms.**—Unless the cysts are of considerable size they cause no symptoms. When of considerable size the symptoms arise from pressure on contiguous structures. Then pain is present, and in about 10 per cent of the cases there is microscopic or macroscopic hematuria. Unless there is other pathology in the kidney its pthalein output is normal.

**Diagnosis.**—The diagnosis rarely is made by palpation. Even when the cyst is a large one and can be palpated it generally is considered to be something else. In some cases there is a pyelographic filling defect that is more



Fig. 259—Cyst of the upper pole of the kidney (Department of Pathology University of Pennsylvania)

likely to be considered to be due to a renal neoplasm. Where calcification is present the roentgenogram usually is safely diagnostic.

**Treatment**—The treatment where any is really needed is entirely surgical.



## CHAPTER XIII

### THE SEXUAL PROBLEM

To consider fully the question of the departures from what we are pleased to call the "normal sexual functions" would require many volumes and, even then, the subject would not be exhausted. It is a realm wherein one should tread lightly, for there are few things in medicine more likely to warp judgment and develop a dream-state of pseudoscience than is a deep study of the so-called sex urge and its innumerable outlets of one sort or another. Even a casual perusal of the "literature" upon the subject will reveal some of the most glaring absurdities wherein the imagination of the sexologist often guides his "science." Particularly is this the case in the field of true sexual perversion. However, it applies in a great measure to every phase of the subject and, often, it misleads more than it teaches.

The extent to which such writings are read by the laity makes it important that the medical profession, at least, should have a saner knowledge upon the problems involved, for no matter which way one turns, "sex" seems to intrude itself. One would almost suspect that Eros was becoming a modern god. With increasing frequency the practitioner is called upon to solve sexual problems that a few years ago rarely intruded themselves, and there is no immediate prospect that this demand will grow less. The red glare of erotomania is in the ascendancy and is being fed to youth and maturity by so many different agencies as to be a matter of deep concern.

In the present connection there is no need to discuss the gross perversions of the sex instinct and its manifestations, for these are not in any large measure the things that confront the physician unless his work is in the field of psychiatry. He is more concerned with what might be called the sex urge and its outlets in the seemingly normal individual. One has to say "seemingly normal" for no one has been able to define "normal" in this regard. The borderline between normal and abnormal in mental processes is decidedly unfixed, and, as sex urge and sex outlet have so much to do with individual psychic atmosphere, it obviously is difficult to define normal in each.

To one who has come intimately into contact with the sexual problems of what we shall continue to call the "normal" human being, there is sure to arise the feeling that our basic ideas of the matter of sex contain many flaws. We have heard so much of this great physiologic sex urge that there is a tendency, on the one hand, to let it serve as an excuse for unbridled freedom and, on the other hand, to submerge it by calling it "vile." And, if we are to reason from our experiences in almost every other field, the saner ground rests between the two attitudes.

There unquestionably is such a thing as physiologic sex urge which differs more or less in different individuals. But there is grave doubt about its being, of itself, such an impelling force in human conduct as it has the rather general reputation of being. That it does initiate excesses in cer-

tain individuals must be admitted, but that it imperatively compels these excesses of itself is probably never the case. The entire question is so intimately entangled with the mental processes of the individual that it often is difficult to give each factor its proper valuation. But there is far more reason to believe that 'sex urge' is more a matter of mind than of internal secretion or basic instinct. Mankind craves pleasure and when his pursuit of pleasure conflicts in any way with social usage, he is glad to justify himself by so convenient and seemingly satisfying an alibi as physiologic necessity.

Evolution, or Providence, has made sexual congress an acute pleasure and human emotions have added to the picture. The act has caught the psychologic fancy and just to the extent that such a fancy engrosses the mind does the pursuit of this pleasure impel its possessor and tend to tear down his inhibitions. So that we safely can say that his internal secretions or physiologic sex urge, if you will, upon rare occasions, may suggest things to the mind, and just what happens then depends upon the character of mind that receives the suggestion. More often the process is reversed in that the mind either spontaneously or from external impressions, generates the idea, and the internal secretions make possible its fulfillment.

Life itself gives us little reason to think otherwise and one has only to analyze what constantly parades before him to realize the truth. If sex outlet in the sense of sexual gratification came as the imperative response to a physiologic urge it would not be so utterly at the mercy of one's mental processes. It would be an impelling force not so easily turned aside. We should not see the possibility of its fulfillment entirely obliterated by so small a thing as an idea. Nor should we see normal minded individuals living perfectly comfortable lives without any sexual gratification whatever. It would have dogged explorers to the Arctic and Antarctic and made life miserable for them and it probably did not annoy them enough to talk about. These hardy individuals whom no one would suspect as being sexual drones offer little comfort to those who would have us believe that mind and, perhaps, body must suffer if that 'great physiologic urge' does not obtain its pleasurable outlet.

It is particularly important that the physician realize the overwhelming part that mental processes play in the desire for and the accomplishment of the sexual act. For so much of his ability to cope with the various departures from normal depends upon such an appreciation that, lacking it, he is prone to give advice and devise plans of treatment that offer little to the patient in either mental comfort or functional improvement. By the nature of things he will have to do in this regard more with the male than with the female. No matter what may be his own feelings on the subject he should realize that much of life rotates around the sex relation and that it is the cause of much of life's unhappiness.

The male of the species is a peculiar animal, often with much concern regarding his sexual prowess, and he becomes mentally sick when he in any way fails to measure up to his own standard. He varies widely in both desire and ability. He generates some of his desire by virtue of his internal secretions, more of it by his own spontaneous or whipped up mental processes, but most of it comes from suggestions extrinsic to himself. Without his special senses he would be a simple problem indeed.

When it comes to accomplishment, he is a variable quantity, as would be expected when one contemplates how widely human minds vary. In order to accomplish the sexual act he not only must have at least some physiologic urge but, above all things, he must have a mental attitude attuned to the event. Without the latter the former is of no avail. And just to the extent that his psychologic processes depart from this attunement will he depart from his own standard of accomplishment. He needs but the fear of failure in order to fail.

Aside from the mere matter of success upon his part looms the fact that there are two parties concerned in the act and that charity, and perhaps policy, demand that he be not too hasty in his pursuits. Wherefore, the question of endurance arises, and such a quality has to do with what one might call nerve-poise. Nerve-poise is perhaps a more variable quantity in this regard than is the strictly mental attitude. Thus, the physician may be compelled to give the question consideration, for it is not without its effects upon the present state of matrimonial unrest. Possibly, one would not hear so much about female frigidity if more attention were paid to this phase of the matter. We should not expect wives to be wildly enthusiastic about acts that so commonly leave them disappointed. Nor should we expect too keen an anticipation from one who sees in the act the begetting of many children. Were the dangers equal or reversed in the sexes, fewer homes would be storm centers and the world rather quickly should settle into a high state of placidity almost devoid of either the hunter or the hunted.

As one analyzes the sexual function of the male he sees an animal endowed with a quality that differs widely in different members of the species, a quality that lies in wait for some psychologic stimulus to arouse it. Lacking such a stimulus, it rarely intrudes itself. He sees an animal in which the love of pleasure is a basic and, at times, a ruling passion. This animal is a thinking one that does not have to rely solely upon the sense of smell, or that illusive something we have called "instinct," to arouse him, as do the lower members of his kingdom. In his savage state his sex indulgence is practically an automatic function that needs but the thought and the opportunity and it is accomplished. It responds normally to pleasure-love without psychologic interference.

When we give this human animal the interior fittings and outward veneer that we call "civilization" we note a change. We see him develop the habit of psychologically meddling with this automatic act to the extent that, though he keeps in a large measure his basic pleasure-love, his mind is occupied with so many distracting thoughts that he often fails to concentrate upon the pleasure instinct as do his less civilized brothers. And, if we measure his sexual prowess by those of his less civilized brothers, we see that he has lost much in his advance. Were this the only cost of his progress the world, perhaps, would be little worse off for his advancement, but we see his nervous balance suffer. In his larger field of endeavor, with its multitudinous nervous and mental strains, we see him become a less stable individual, we note wider ranges of what we must call normal, from a temperamental standpoint. And this change in nervous poise reflects itself in his sex life in many ways and serves as a basis for much matrimonial and social maladjustment.

Knowledge of these influences upon the part of the physician is essential to a proper interpretation of the sexual derangements of the normal, white male. One rarely finds such changes in those of the Negro race until we add education to complicate the psychologic processes, to blur the innate pleasure instinct and to interfere with mental concentration on sex.

One should not assume, however, that these changes due to civilization are attributable alone to higher education, and that, for that reason, higher education introduces of itself the greatest sex hazard. The question has to do less with what a man knows and more with how a man thinks. For which reason, one finds sexual disabilities in the more temperamental oftener than in the more stolid races and individuals. And to the extent that temperament leans toward instability, does the medical problem increase.

One cannot view lightly the importance of the sex call and its various manifestations in our present day scheme of things. And he is not a wise physician who ignores the problems that it presents for he must realize that a large share of his usefulness to society depends upon his ability to deal with mental aberrations as well as physical ailments. Except with the definitely psychotic, few patients are more mind sick than are those who for one reason or another, become aware of the fact that they are not sexually normal. An off hand dismissal by the physician gives them scant comfort and may lead to deplorable consequences.

It is not necessary that the physician be deeply learned in either psychology or psychiatry to understand the mental workings of those who have developed some functional sex abnormality. As a matter of fact he need only let his mind wander back to his boyhood days and recall his varied reactions to things that spoiled what to him were extreme pleasures. Men are just boys of greater physical stature, perhaps only better actors in that they can hide their reactions more cleverly. Some of them have better brakes on the urge to animal pleasure and some have minds too busy to fret much about the matter.

We might bring in evidence the almost universal reaction to that late experience that bore the decidedly facetious title 'prohibition'. Seldom has civilization seen such a general reversion to the puerile even the infantile. Millions who never had the slightest craving for alcoholic beverages, stocked their cellars or filled their hip flasks solely because a "nobly conceived social experiment said, 'Thou shalt not'. That a paternalistic government should tell one what must be done about alcohol became sufficient justification for all sorts of legal flaunting by otherwise law-abiding individuals. It was all 'wrong,' though it was perfectly proper that the same government should do the same thing about narcotics. We all know that alcohol does a thousand harms to one good but how much did we hear about it? The question of the wisdom of the move is aside from the point. The outstanding feature of it all is the decidedly general mental reaction that followed a reaction in which true social values were cast to the winds by our commonly so called best citizens and whereof it commonly was said that 'our best citizens had become our worst citizens'.

Then some misguided minds promulgated the idea, and got it on the news stands that sexual outlets were a necessity if youth was to reach useful adult life. So what right had Society to say 'Thou shalt not' when the pseudoscientists said 'You can't reach mental maturity unless you do'?

Also, the matter had to do with the pleasure outlets of mankind. So youth was only too glad to accept the excuses and react as had their elders to the alcohol question. And the elders, not to be outdone, saw what "fun" youth was having and let down their own restraints. Perhaps this was "social progress," but there is ample reason to suspect that it was reversion. There are ancient Rome, Sodom, and Gomorrah to suggest that there was nothing new or ultramodern about it. At least, some of it was a psychology grasping at straws to justify the pursuits of pleasure, however unwise or harmful the "new freedom" might be.

In a study of these widespread mental reactions, with their countless alibis and justifications, one finds a wealth of practical psychology. At least, it is obvious that what we call "mental maturity" is not necessarily a matter of age. The older minds may sulk and peeve at restraints aimed at an unbridled pursuit of pleasure just as the more immature ones do. The only difference is that the rebellion is not so obvious to the onlooker.

Just what changes these things make in the mental outlook depend upon the type of mind that is undergoing the struggle. And it is only by letting the individual talk that one may arrive at an understanding of what it all means to him. Perhaps nothing helps the physician more with those individuals who in their sex pursuits have met with misfortune than to try to put himself mentally in the other's place. In doing this he must realize that sex is largely what one thinks of it, and the man who has met with disappointment or has found reason to worry about it, is likely to think more of it than of anything else. Formerly, it may have been but a few brush marks in his life's picture, but, as the result of the mental brooding, it has been magnified until it has become almost the whole of the picture.

Any individual who has allowed some real or fancied sexual difficulty to dominate his conscious mind is just as mind-sick as is any other individual with a psychoneurosis. And no matter what the physician's idea of the normal aspects of sex and its outlets may be, such a patient is as deserving of a hearing as is any other. To hurry him is to be guilty of a gross injustice, for it is only by listening to his troubles that one may arrive at an understanding of him that is of value in producing cure. It must be realized that today "literature" and human contacts fairly reek with a type of sexual pseudoscience that could do nothing else but cause all sorts of demoralizing mental fixations. And unless one has discovered and removed these fixations he has done little for his patient.

**Endocrinology and Sexual Performance.**—At the present time there is a decidedly widespread tendency to attribute to increased or decreased action of the glands of internal secretion a multiplicity of things that, often, are lacking in scientific justification. This is particularly so of departures from what we have grown to consider as normal sexual function. Gradually, there has been built up a veritable mountain of pseudoscience that has done much to lure men from a safe and common-sense view of things that usually are due to other causes which have nothing to do directly with hormonal balance. When one reads that an investigator claimed to have produced, by the injection of a gonadotropic hormone, sustained penile erection where there formerly had been none, he could be pardoned if he thought that there, at last, had been found an answer to many of his pa-

tients' difficulties. If however, he recalls that equally dramatic results have been obtained in thousands upon thousands of cases by the mere substitution for some faulty ideas of those a trifle more in tune with their sexual opportunities he may discount the value of a few observations made in patients who are receiving such hormones.

If the physician still feels the hormone lure for the treatment of that great army of individuals whose standards of performance are not in accord with their dreams or wishes, he might gain a slight degree of poise by listening closely to the histories of a few of those patients who consult him because of sexual impotence and by applying some broad medical reasoning to the matter. Except through disease operation or accident, the glands of internal secretion do not suddenly stop supplying their particular hormones. When they have struck their normal balance following the developmental stages of life they keep rather steadily "on the job." They are not like the possibility of sex performance, here today and gone to-morrow. They do not, as the power of penile erection does stop because of an inhibiting thought. To blame them for things that they could not do and leave the individual in health, usually, is to grasp at a material basis for so easily discovered a thing as a mental fixation.

In its general scheme sex performance reminds one very much of his first new automobile. At first, he must run it slowly to let things "work themselves in" (childhood). Then he wants to see how much speed the thing can develop (youth). After this has been determined, he is likely to hold his speed up somewhere near the legal limit (early manhood). Then, he begins to realize that automobiles hold a danger commensurate with the speed with which they are driven and he slows things down a little (middle life). Later, the poor old car develops a few knocks and wheezes, has trouble on the hills, and is not so lively on the up take (later life). And, finally, it uses so much gas and oil and has so many other signs of decrepitude that it is glad to pull into almost any automobile "graveyard" for a season of much earned rest (old age and its rocking chair). And so, in normal human beings, apparently, goes the trajectory of the sex hormones. In late childhood and early youth they have a big developmental job to do and usually, they do it well. Having developed the machine, their function is to keep it oiled, and they usually do this with attractive steadiness and persistency. Then, as the machine slows down, they, too, settle down. They supply what is needed but the demand is not so urgent or great as it used to be.

Of course, as with automobiles, there are human beings in whose development the hand of the Maker seems to have slipped or grown unsteady. For, in some way, they fail to reach that sexual state that we, here, are calling "normal." And there are some who just about reach the lower limit of this zone. Taken in early life and given the "helping hand" of some development producing hormone their number, though never large, unquestionably can be made far smaller than it now is. This we know. But where we enter the land of dreams is upon the question of just how much can be expected of or done by hormonal administration years after these developmental faults might have been corrected. In him who has "made the grade," it often is questionable, and may be dangerous experimentation with things that are perhaps better let alone. Certainly, in the

present state of our knowledge, it is definitely experimental. It is experimentation in a field so intimately associated with the individual's mental processes that there are more likely to be a thousand misinterpretations to every one that is based on fact. And the physician who would steer a safe and sane course might do well to make every effort to rule out the influences of psychic misalignments before resorting to things that may upset what Nature has done so well—things that so often are useless in such patients and, not uncommonly, dangerous.

Most assuredly, if sexual impotence, premature ejaculation and other suddenly appearing sex disturbances are due to alterations in hormonal balance, the writer has shown upon countless occasions that these imbalances (?) can be corrected by way of the individual's conscious cerebrations. For he has been successful to a most attractive degree in removing these difficulties by simply changing the victim's way of thinking. It was, indeed, kind of these off-balance (?) glands of internal secretion to have allowed him to do so.

**Posterior Urethral Disease in Relation to Sexual Function.**—The writer realizes that he is tearing down idols when he expresses his opinion of posterior urethral pathology as a factor influencing things sexual. Few thoughts are more firmly fixed in the general medical mind than that pathology of this portion of the urogenital tract bears a causal relation to an assortment of sexual disturbances. Volumes have been written on this association and posterior urethrae and verumontana have been prodded, stretched, cauterized and otherwise treated to break down this "vicious influence." For years the writer has studied urogenital tracts visually, digitally, symptomatically and microscopically to discover how and why we developed the ideas that hold and, mostly, he has failed. To him, it is obvious that, with the exception of nocturnal emissions, posterior urethral pathology has no influence on sex possibilities, prostatic pathology very little, as a rule, and seminal vesicular pathology about the same amount. He knows of no lesion or lesions of the posterior urethra or verumontanum which cause impotence, premature ejaculation, delay of sexual climax, or any other deterrent to sexual possibility. Those he knows that have any relation to these things are caused by them and not the cause of them.

If every one or, even, a fair number of the individuals who present the urethral lesions that are supposed to bring about these sexual changes really had them, the world would be a very different place in which to live. Many of us and our friends would be profound psychoneurotics and all of the neurologists would grow rich, but lead very unhappy lives. The urologist's eyes would ache from looking into urethrae.

There is, of course, no thought that posterior urethral pathology does not cause symptoms; it is merely that, with the exception of involuntary seminal emissions, the symptoms are not sexual. Assuredly, they are not impotence or premature ejaculation—these belong to higher centers.

Simply because pathology in this region causes pain at the moment of ejaculation in some few individuals, and because the pain occasionally causes the individual to avoid the act, we cannot view that as a direct influence on sexual ability. Nor can we say that, because masturbation causes verumontanal congestion and verumontanal congestion brings about a degree

of sexual erethism in some individuals, there has been introduced a sexual disability, for it merely has been stepped up and made more pleasurable for the victim

About all we safely can say about these structures in regard to sex is that cysts, inflammations and congestions very commonly overcome normal inhibiting factors during sleep and there occur involuntary nocturnal emissions. So easily is this fact established that local applications to the verumontanum usually will check the emissions for days or weeks, reducing them to a frequency in conformity with physiologic normal for the given patient. Such applications do not directly influence either premature ejaculations or impotence.

An abundance of observation of those whose verumontana have been destroyed by one means or another has served to discredit the idea that this structure is a sexual center in the true sense of the word. One without a verumontanum is just as potent and virile as is one in whom this structure exists. Rydina, who has surgically removed many verumontana has shown this beyond any possibility of doubt. The writer has studied a large number of perfectly potent patients whose verumontana had been destroyed by some type of urethral treatment. The influence of this structure in the production of sexual erethism or nocturnal emission apparently differs in no way from that of nerve end irritation of the glans penis. Both exert their influences on the sexual centers of the spinal cord.

As is stated elsewhere, sexual ability, aside perhaps from the automatic erectile response to local titillation or the like, is a matter of psychoneural stimulation and not of the posterior urethral structures. Further, if sexual ability is restored by applications or treatments to the posterior urethra or verumontanum, it would be best to attribute the result to the breaking of a psychic inhibiting fixation rather than the removal of supposed causal influences in these structures. Far greater and more lasting success is to be obtained by centering attention on the patient's psychology and leaving the urethra alone, so far as sex is concerned. For, in most cases, one only deepens mental fixation by these means. Many of our so called "sexual neurotics" are made by such methods.

**Prostatic Disease in Relation to Sexual Function**—Obviously, one cannot so sweepingly dismiss the question of the influences of prostatic pathology on sexual function as he can those of the posterior urethra and verumontanum. For there is real reason to believe that some forms of prostatic pathology obtund both sex desire and sexual ability, while others greatly increase them, for a while at least.

Clinical observations and experiences give us much reason to believe that a properly functioning prostate gland often has much to do with sexual vigor. We see, on the one hand, a definite obtunding of sex desire and, at times, of ability, in the presence of prostatic infection or congestion in some individuals. And we see a restoration to normal follow our treatment of these conditions, a restoration that seems to have more to do with the promotion of drainage and the possible forcing of substances from the gland into the general system than to any psychic change. For it occurs in the entire absence of efforts to change mental outlook.

On the other hand, we see the definite and, at times, excessive increase in sexual desire and ability so common to the early months of prostatic



hypertrophy, a temporary rejuvenation that so often turns the masculine mind toward the early pursuits and leads many a youthful bride into later connubial disappointments. For this sexual flash dies down when the intraprostatic pressure of the new growth becomes too great for proper glandular functioning. Here, again, we see much the same picture that we encounter in our prostatic massage, giving us reason to believe that slight intermittent or continuous pressure on a functioning prostate causes the forcing into the system of some substance that adds to the feeling of well-being and often greatly increases both sexual desire and power of performance. And, when the continuous pressure becomes too great, we may vision a systemic denial of that invigorating substance, much as we sense it in the presence of gland congestion or, at times, infection.

So strong is the evidence of prostatic values in the presence of failing desire or performance as to give definite value to the performance of prostatic massage in such cases, even in the absence of demonstrable prostatic pathology. Also, the contacts afforded by a short course of such treatments give greater opportunity for the exhibition of a more thorough course of the psychotherapy so greatly needed by most of these patients.

However, it should not be assumed that every patient who has an infected or congested prostate gland has a lessening of desire or an obtunding of sensory pleasure, for some seem to experience just the opposite. There are, however, enough who do, and who without mental suggestion improve on prostatic massage alone, to suggest strongly that the gland does exercise some direct influence upon desire and possibility of fulfilment. On the other hand, the entire phenomenon may be due to the fact that the individual just feels so much better that his mind naturally turns toward pleasurable outlets.

**Seminal Vesicular Disease in Relation to Sexual Function.**—Aside from their rôle in voluntary and involuntary seminal emissions, in which they seemingly play a secondary part, the influences of the seminal vesicles upon true sexual function are largely unknown if, indeed, they exist. For there is little reason to suspect that these organs, whether pathologic or normal, play any other part in desire or performance except, perhaps, the erethism at times resulting from their overdistention.

While much has been attributed to pathology of the seminal vesicles from the sexual standpoint, there is little or no direct evidence that they cause these things. Mostly, they are silent structures which, except when acutely infected, give little annoyance to the patient. Chiefly, they are a source of diagnostic error to the physician, and countless vesicles are pronounced pathologic which are in every way normal.

**Sexual Continence.**—The term "sexual continence" means the absolute avoidance of voluntary sexual relief. By some it is considered to mean a self-restraint to the point of complete avoidance of sexual intercourse with the opposite sex. The former, however, is the more generally accepted meaning and the one to which we shall adhere in the present discussion. Assuredly, it is the one taken by those who write most about the supposed dangers of an absence of sexual outlets.

With the countless possibilities for sexual relief without actual sexual intercourse, it is probable that true continence is almost as rare as are dodo birds. So that those who would have us believe that the denial of sexual

outlets is of itself a detrimental thing to both mind or body are making a great to do about something that rarely exists. In their dissertations one hears much of the supposed harm and nothing about the rarity of the condition said to cause it.

One does not have to apply much study and observation to the question to discover that there is a large Senegambian in the small wood pile. Obviously this supposed harm that results from continence is not really due to the continence itself but to the constant fretting about it. The individual who mentally sublimates matters is never harmed by continence.

Thus one must make some qualifications when he starts to talk about the harm it does or may do. Just what harm it does depends entirely on the type of mind that follows it. And the mentality that fails to sublimate matters rarely is the type that would hesitate to find other means of sexual gratification. Elsewhere we have stated that 10 per cent of sex as we see it, is physiologic urge while 90 per cent is mental whip up. And Nature has arranged rather well to care for the absence of sex outlet without harm to the individual from a physiologic standpoint. She however has not made such provisions for the psychic aspects of sex and it is here that judgment is needed.

One rather well might sum the matter up into two final conclusions. First for the individual whether he is well sexed or not who puts sex outlet psychologically in its proper place in other words sublimates the matter it can be said that complete continence does him no harm what ever second the individual who does not or cannot sublimate it but keeps himself constantly stirred up about it is harmed by the mental unrest and not the continence. He would do himself the same harm if he constantly fretted about something else that he wanted and could not or dared not get.

Unquestionably it is not to the best interest of society that either youth or adults should be taught that continence of itself is a harmful thing. Yet this teaching is to be found in many of the books on sex that are available to the public. In this age of freedom nothing is more greatly needed than an understanding of those facts that underlie sex so far as the individual is concerned. Not only should the physiologic side of the question be known but there is far more need for a wider knowledge of its mental aspects. To sweepingly say that continence is an unhealthful thing is to encourage unbridled sexuality.

Those who delve elsewhere in the animal kingdom for proof that humans must indulge themselves sexually lose sight of that wide gulf between creatures who follow instinct and those upon whom God has bestowed the gift of a deliberating mind. Closely viewed there is no real analogy between the sex of the two and were mankind dependent upon olfactory stimulation of sex as are the males of the lower members of the animal kingdom there would be no sex problem for us to worry about. One does not think of sex denial in animals as a harmful thing and it is not solely because the possibility of constant mental craving does not exist.

To prescribe sex freedom is only to make worse the already complicated social slum to do for the patient just what he wants done to put him at rest with his conscience and to give him courage to follow the lure. The number of young men or young women who after so called psycho analysis are told that they need sexual experience is depressingly large.

The pronouncement is not news to them; they knew it before the analysis. In fact, it was their reason for submitting to the analysis. All they wanted was to hear the "wise men" say so, to get "scientific" justification for a course of action that, otherwise, they lacked the courage to pursue. If it were not so pathetic, often tragic, it would be downright humorous that members of a dignified profession should be used for such a purpose.

**Sexual Impotence.**—Inability on the part of the male to accomplish the sexual act may be due to one of several causes. These causes rather readily lend themselves to consideration under four different headings, namely: anatomic, physiologic, paralytic and psychic. Of these, the first three are responsible for so small a percentage of the cases consulting the physician for this condition that they well might be considered briefly and dismissed.

*Anatomic impotence* has to do with that very small group of individuals whose sexual organs are so deformed as to preclude the possibility of natural sexual congress. In most of this group inspection alone solves the diagnostic problem, and the only question that arises is the possibility of correction by surgical measures. In this group, also, might be included that small number of individuals in whom a penile curvature occurs as the result of plastic induration of the penis, which is elsewhere considered.

*Physiologic impotence* is due to permanent or temporary absence of true sex hormones. This may be the result of essential endocrine imbalance, testicular trauma, and occasionally testicular atrophy resulting from cryptorchidism, mumps, some other diseases, or trauma. More often, these latter conditions are associated with a lessening of sexual vigor rather than an essential impotence. Such individuals are particularly apt to be found among the cases of psychic impotence, having ambitions far beyond their innate powers of performance.

Temporary physiologic impotence is seen in individuals convalescing from prolonged illness and in those who have indulged to the point of functional exhaustion. In both, however, there is just as often an assortment of complicating psychic factors. One exhausted by prolonged illness usually has his mind on things other than sex, and he who has indulged in sweets to the point of satiation would not be expected to enthuse greatly over one more piece of candy.

*Paralytic impotence* is confined largely to those individuals who have some organic change in the central nervous system or who have had local nerve destructions from either operation or injury. Such patients have no erectile power whatever and, with the exception of some cases of carefully treated tabes dorsalis, rarely regain it. Fortunately, they do not make up as many as 0.1 per cent of the patients consulting the physician for this malady. Furthermore, their minds are filled with other things.

*Psychic impotence* is the most common type of sexual deficiency in the male. It includes at least 99 per cent of those individuals experiencing failure in accomplishment of the sexual act.

In many quarters great effort has been expended in fostering the belief that most, if not all, of the cases occur as the result of some local pathology. One cannot deny that some of them do present some change from normal in the lower urogenital tract. But it should take little observation to convince the physician that only upon the rarest occasions can this

change account for the sexual disability. As elsewhere is stated the pathologic changes in the posterior urethra and prostate usually described by those who would center our attention upon local causes rather than mental occur with at least fifty times the frequency in individuals who have no sexual symptoms whatever. Further they are local conditions rather easy of correction in most patients and unless attention is given to the creation of a profound psychologic change toward the act no improvement is seen in the power of accomplishment of it as the result of their removal. On the other hand one may ignore the local pathology so far as the impotence is concerned and through psychologic retraining overcome the sexual disability in an overwhelming percentage of the cases.

Certainly in this type of case the fact that some urethral treatment quickly restores the potency of some few patients is no proof that the impotence was due to the local lesion treated. Such treatments are dramatic and if done with the assurance of success this conviction occasionally is communicated to the patient and makes the required psychic change. One may with greater frequency have equal success if he will look such a patient in the eye and tell him that if he will take two of these pills bread or otherwise just exactly fifteen minutes before he starts the act he will have no trouble whatever. Most psychic scars however are not so easily removed for not only do they vary in kind but they vary greatly in degree.

Despite the preponderate influence of psychic impression one should not entirely lose sight of the possible role of local pathology in bringing about a reduction in desire that might make an individual an easier victim to the milder grades of psychic impression. True psychic impotence is rarely of gradual onset but usually dates from a sudden loss of erection as the result of a definite mental impression.

All things being propitious it is safe to start with the conclusion that any normally constructed male who can get an erection should be able to accomplish the act. In order to do so his pleasure love must be in the ascendancy and uninterfered with by inhibiting impulses, doubts or fears. Just to the extent that these latter begin to intrude themselves does the individual fall below his own standard of accomplishment. Nor does he recover his former ability until he is able to replace these disturbing mental lapses by an indifference to them that makes for confidence.

This being essentially a psychologic problem one cannot lead his patient to cure as a rule without the use of much psychotherapy and he cannot apply mental retraining to very good effect without learning what is wrong with the particular mind before him. For this reason the taking of a careful history is of paramount importance. In such a study one should start with a consideration of the patient's former sexual history in order to judge what is normal for that patient. From a careful inquiry of the sort an estimation usually can be made as to how much he was predisposed to failure through lack of physiologic urge, lack of desire, psychic repulsions or nervous instability. For there undoubtedly are individuals who more easily become the victims of impotence because of these factors some of which may be carried over from childhood impressions. Such a knowledge is of importance to the physician both from the standpoint of prognosis and of knowing just how high he may aim at the target of

success. One would not expect to make a veritable Don Juan of an individual who, because of these things, had a definite limitation above which he could not rise.

Aside from these possible inherent qualities, one needs a knowledge of the condition of the prostate gland to assure himself that some of them are not due to local causes. Fortified with this knowledge, the physician is ready to dig more deeply into the true mental processes at the time of downfall, to develop the doubts, fears, repulsions, and the like that served to precipitate it. And he only can gain this information by gaining the confidence of the patient through a frank and sympathetic attitude toward him.

It is to be expected that such things as physical fatigue and sexual satiation should blunt desire. Fatigue needs rest, and one would not expect the satiated to crave wildly. And the two are rather common precipitating factors of impotence. The first failure to accomplish the act breeds much humiliation and engenders fears that make each attempt thereafter equally futile. Instead of thinking pleasure, the entire attention is centered upon the possibility of failure and, "as a man thinketh, so he is." Thoughts of failure breed failure just as surely as thoughts of success lead in that direction.

To correct a mental fault one must know that he has such a fault and, as the cure of psychic impotence is a matter of mental retraining, it is of the utmost importance that the patient understand thoroughly where the trouble lies.

Man is rather proud of his mind and he leaps to justify its lapses. In this regard he throws the entire blame upon his body and gives his mind a clean bill of health. So firmly fixed is this habit that it is by no means a simple task to change it, and, yet, success depends upon the change. He should be apprised of the fact that his sexual apparatus neither sees or thinks and that, of its own volition, it could not fail him always at the same time. It does so because of the psychologic meddling he is doing with a practically automatic function, because he is replacing desire by doubts and fears.

Attention should be given to any prostatic as well as systemic departure from normal and, even in the absence of prostatic pathology, prostatic massage should not be forgotten as rather a reliable sex invigorant in many patients. Such treatments have the added advantage of giving a greater opportunity for continued psychotherapy, as has been pointed out.

It is a rather well established fact that we have no aphrodisiac drugs that give benefit to these patients. And it is a highly fortunate fact that in the hands of an understanding and interested physician such patients have no need for so-called aphrodisiacs. It is not in evidence that any of the sex-gland preparations so loudly vaunted by those who manufacture them change the picture in the least. And the so-called rejuvenation operations have limped out of the medical picture in a way that sheds little glory upon those who so dramatically forced them into it.

It is a clinical fact that one who has failed in the accomplishment of this act rarely overcomes his disability unless conditions at the time he tries again approach the ideal for such events. There should be nothing in his surroundings that engenders doubts or fears. He should not try to force desire mentally but should allow his special senses to do the suggesting.

He would do well to enter the bed of hopeful fulfilment with his mind on other things

If he believes what his physician has told him and avoids psychologic meddling Nature shortly will assert herself and make success possible providing he does not delay long enough to think of other things than pleasure. Once having overcome their disabilities most individuals have little or no trouble thereafter or, if they do they realize wherein lies the fault and usually overcome it without medical aid

There occur individuals whose psychic upset is so great that even desire itself is obliterated whose feeling of hopelessness is such that erection does not take place. In them psychotherapy must go even further back than is usually needed. They must be absolutely convinced that the only thing wrong with them is that they have given up, have become so resigned that they do not even entertain pleasurable thoughts regarding the act. They say 'I can not even before they have a chance to try. Assuredly one must have the will to do and the wish to do if he is to have any measure of success. He cannot spend months at repression and expect to succeed at the snap of a finger. To be a Don Juan one must give thought to the fun that Don Juan had and unless he can do this he does well to avoid the company of females who experience the great desire.

Simply to tell such a patient that it is all in his head is no help to the patient nor does it make him think more of his physician. A patient dismissed in this fashion turns to another physician or seeks literature upon the subject and most of the literature available to him is of a nature to intensify his fixations and make him an easy mark for some charlatan. These gentry make much of their living from such unfortunates.

To sit down and talk to him in a way that he can thoroughly understand about the why and the wherefore of impotence is to deny aid and comfort to unscrupulous practitioners and to rescue him from the slough of despond. Comparatively few patients are unable to grasp the truth when it is properly presented to them. They can understand when told that erection is an automatic response to pleasurable sex thoughts and it can be maintained only as long as thoughts are those of pleasurable anticipation that it is natural for all men to lose an erection if they let doubts or fears enter their minds and that one not only cannot will himself to have an erection but unless he starts with the proper kind of sex thoughts he will not even get an erection. The knowledge that there is no local pathology that possibly could make him truly impotent if he is able to get an erection at any other time, goes a long way toward convincing him of the true cause of his disability.

The question often is asked: What is one to do with the individual whose mentality or lack of knowledge of a language makes such rational psychotherapy impossible? Well there are many ways of influencing the human mind and one could turn to medicines in a convincing way and often meet with success. A rather successful plan with such individuals has been to get nine white tablets and one highly colored one to look the patient straight in the eye and in my most convincing way, inform him that if he will do exactly as he is told he will be cured in ten days. He then is told to forget the ladies until the tenth night. Each intervening night he is to take a white tablet exactly fifteen minutes before he retires.

On the tenth night he is to arrange to go to bed with his enamorata, but that he must think of other things than sexual intercourse. He must take the colored tablet exactly fifteen minutes before getting into bed and spend the first fifteen minutes talking common topics. At the end of that time, if he pays a little attention to his companion, he will find himself quickly fitted to perform to the satisfaction of both if he does not linger too long after he is ready. This method is highly satisfactory if the physician is a convincing "salesman," but it has one possible drawback. If he forgets the size and color of the tablet that turned the final trick he will have scant success in the future if the patient's difficulties happen to recur, and he is given a tablet of another color.

Fourteen years ago the writer "cured" a very intelligent patient of impotence by telling him that he needed a little stimulation before attempting the act and, if he would take  $\frac{1}{30}$  grain of strychnine before retiring, everything would be propitious. It was, but it never has been without the strychnine or enough liquor to make him forget all about it. It would have been just too bad if he had been given a prescription and forgotten what it was. He probably would have lost the younger woman he later married.

The tendency of looking for superscientific reasons for perfectly simple things is nowhere more evident than in the consideration of sexual impotence, and the nearer one sticks to the simpler views the more successful he will be in solving the problems presented to him. The frequency with which these patients fall within the narrow limits herein outlined makes it possible, after a little experience, to hear the first part of the patient's story and fill in the rest for him, or to go from mental fixation to mental fixation in a way that surprises the intelligent patient. For instance, a prominent young neurologist came into the writer's office with the painful statement that he had been married three years and had never been able to consummate the marriage. After telling him he was an excellent example of the writer's definition of psychology, which is, that it is pseudoscience that has to do with the analysis of everybody's mental processes but your own, an offer was made to tell his story for him. After an expression of doubt on his part, the story was told as follows: "You are of the extremely sensitive type that would put the woman you loved on a pedestal so high that the mere thought of sexual intercourse would mean defiling your idol. That, of itself, would make you impotent so long as you held it.

"When you found the idol was really human and wanted to be defiled you would have accomplished the act if some other mental fixation had not prevented. It probably is safe to say you either have, or think you have, an unusually large organ. And, by the same token, you must have a very small wife. [Both were true.] Thus, entered the murder complex and every time you contemplated the act you would think so much of the damage you were sure to do that you would be incapable of doing it.

"One must go further than this, however, for there must have been occasions somewhere in those three years that you would want to murder her and she not only lives but is still a virgin. If you want to be cured by morning I would suggest that you get out of the twin beds, get in a sociable double bed and, when you are ready, do not give yourself any

time to think of all those old inhibiting thoughts. Also you might give me a telephone report in the morning. Not only did a delighted telephone call come the next morning but I understand children followed in due season.

It should not be assumed that all of the deterring factors belong to the patient alone as many patients are signally potent when they roam who are equally signal failures at home. Of course the reason is psychic but it is so because of a repulsion rather than a fear. And such repulsions may be due to a large assortment of reasons that often nothing but the closest questioning will reveal. Recently such a patient presented himself. He had considered himself rather good sexually, and he was with everyone but his wife whom he loved very much. The trouble there was that the wife had a habit of making him wait while she went to the bathroom for a contraceptive and then she indulged in casual conversation both of which dampened his enthusiasm to the point of failure. A few words to the wife who knew nothing of the reasons corrected matters.

Rather often the difficulty dates back to some youthful or childhood impression wherein false standards are set, repulsions are developed or other inhibiting factors enter. We see the effects of these in the individuals who cannot cohabit with women who show the mothering instinct (mother fixation), those who must peep through a keyhole while the female is disrobing, those who are potent with blonds and impotent with brunets or the reverse, those who fail unless the woman wears stockings and a host of other equally queer things. Thus there may enter the need for a careful delving into the early mental impressions of the individual and efforts to overcome them if one would rescue the patient from his ocean of discontent.

**Premature Ejaculations**—The continuance of the sexual act for any great length of time requires an amount of nerve poise that is difficult for some individuals to attain. There is a considerable number of men who for one reason or another find it difficult or impossible to perform in a way satisfactory to their female partners or to themselves. In some orgasm is so precipitous that it precedes intromission and in others it occurs almost immediately thereafter. This unfortunate state of affairs is a cause of much marital maladjustment for which reason it is a matter of considerable importance to the medical profession.

In premature ejaculation we encounter a state of affairs almost the opposite to that so commonly ruling in psychic impotence. Instead of mental inhibitory influences there is a stepping up of desire to the point of explosiveness. As would be expected it is most common in individuals with a low threshold of nervous stability. It is particularly common among the Jews though they have no monopoly on it. In fact it is safe to say that a great proportion of all males experience the condition at some time and many of them do not overcome it to any marked extent.

If one may judge from the statements of many men as to the length of time they continue the sexual act he would be inclined to place a goodly proportion of them in a class that did not give great promise of pleasure on the part of their sexual partners. For it is not unusual to have them almost boastingly say that they can continue the act for two or three minutes. A woman would need to be considerably interested in the flowers



of sex to think that her life was a bed of roses under such conditions. So we can, with some justice, include in our discussion a large share of masculinity under a subheading of "near-premature." They, of course, are not altogether to blame for their plights, for many of them are married to women requiring rather prolonged prolegomena before interest is aroused, and it takes a decidedly well-poised male to stay in the marathon class after such procedures. Herein, one finds the suggestion for cure of many of them, though it may be rather a one-sided approach. However, right-minded women, as a rule, find it possible to readjust themselves to the change of method.

Premature ejaculation is extremely common at the first few sexual efforts of many males. It also is rather common in members of the Jewish race whose wives make great demands upon them in hopes of pregnancy, particularly in those of decidedly nervous temperaments. In the colored race it probably never occurs, unless they have better than a high-school education.

Before one starts to plan the treatment of such a patient he does well to inquire into his mental attitude at the time of the act, what is required of him by his partner in the way of prolegomena and the behavior of the partner at the time of coitus. Particularly are the last two of great importance, if success is to be had. For the one, it may be necessary to discontinue the prolegomena to correct conditions. For the other, one could have quick success if he could chloroform the wife, or otherwise reduce her enthusiasm.

In this latter group of cases one does best to talk matters out in the presence of both parties. Usually he finds a disappointed woman who has developed the habit of frantic hurry in the vain hope that once in a while she will be the first to reach a climax. It will require but little conversation to convince her that she is hopelessly handicapped in the race and that she will remain so unless she changes her system. She should be urged to curb her enthusiasm to the point of complete inactivity. Her partner, immediately after intromission, should thoroughly relax and get his mind on something else for a moment or two. A very good plan is to have him watch the second hand of his watch make a complete revolution, concentrating upon it mentally. He then should indulge in some leisurely activity but should thoroughly relax the moment he feels that he is approaching an orgasm. By several repetitions of this he usually finds himself in a state of nerve-poise wherein both he and his partner can complete the act normally.

The cure of those individuals who experience ejaculation before intromission is not always so simple a matter. In them, preliminary excitation should be reduced to the vanishing point. They should be told of the influence of excessive nervousness and warned against sexual efforts under circumstances prone to increase it. The taking of bromides some time before, at times, will reduce nervous irritability sufficiently to produce results. Upon very rare occasions an application of 10 per cent silver nitrate to the verumontanum will help, for a few such patients have their erethism increased by posterior urethral congestion. Prostatic massage at times will serve the same purpose for, largely, the posterior urethral congestion is but a part of a sluggish prostatic circulation from infection or other causes.

It is however unwise to take the patient's mind off nervous influences and place it on his genital apparatus. To do so often is to precipitate a psycho-neurosis.

**Failure of Ejaculation**—For one reason or another an inability to bring the sexual act to its proper climax is a very common condition in the female. In fact it is one of the most usual underlying factors in the sexual maladjustment of married life. Such an inability at times presents itself in the male sexual picture and may become a source of much anxiety to its victim as well as annoyance to his partner.

In such a male there is experienced no difficulty in the act of intercourse except that ejaculation is accomplished with great difficulty or fails to occur. Such an individual usually complains of almost an entire cessation of pleasurable sensation during the later stages of the act. This statement has a definite tendency to turn the physician's thoughts toward possible local or spinal cord changes that could in some way obtund the transference of local sensations to the spinal and cerebral sex centers. And because of this much effort usually is expended in a search for local pathology that rarely if ever explains the condition.

While it is true that local interferences with nerve sensation may reduce the afferent sensory impulses sufficiently to prevent ejaculation one is hardly likely to encounter such a case in many years of practice. The same does not apply to spinal cord lesions to an equal extent for in the early stages of *tubes dorsalis* the first sexual change may be an inability to reach the point where ejaculation takes place. Consequently, one should not overlook such a possibility in any case presenting this symptom though he is not likely to find such an explanation in more than an extremely small percentage of such patients.

A knowledge of the usual sexual habits of individuals who present this symptom soon will cause the physician to look far beyond the sexual apparatus for an explanation of it. Usually it springs from a mental attitude born of much sex indulgence. While it is encountered most commonly in the individual who has accustomed himself to great prolongation of the sexual act it occasionally occurs in those who have not reached such a high state of endurance but whose frequent journeys have engendered an approach to satiation.

As one pursues his investigation of these individuals he finds himself again in the field of sex psychology as would be expected. He has little difficulty in developing the fact that the patient fails to reach the sexual climax solely because he has not kept himself mentally attuned. Some where in his journey the mind has wandered from the pleasure of the event and he finds it impossible to bring it again into normal alignment. When he essays to terminate the act properly he is surprised to find that he can not do so. The more feverishly he tries the more surely does he fail. And upon his mental attitude toward such failure depends his future sexual history. If he attributes his failure to his sexual apparatus he may develop an assortment of phobias that eventually lead to psychic impotence. At least he will have many repetitions of the initial experience.

If on the other hand he has the intelligence to place the blame where it belongs or his physician points it out to him his cure usually is a simple matter. It rests solely in overcoming fear and developing a degree of men-

tal concentration during the sexual act that prohibits the intrusion of thoughts that in any way could interfere with its reaching its goal. To do this the individual who has habituated himself to great prolongation of the sexual act may experience difficulty. He accomplishes this feat by mentally obtunding pleasurable sensation and, once having failed to restore his appreciation at the proper time, he may find the mind slow in doing his bidding thereafter. For him, cure may depend upon, at least, a temporary abandonment of his Senegambian technic and a return to less deliberate methods that do not offer so much time for the intrusion of inhibiting mental attitudes. Usually, he will gain much from a sexual rest and little from medication or local treatments. Above all things, he should be assured that the condition is mental and not sexual. It usually requires little effort to convince him that his trouble comes solely from the fact that he got the idea that he could not complete the act, and that he was concentrating upon that rather than the pleasure of the pursuit.

**Involuntary Seminal Emissions.**—Emissions, or "pollutions," as they rather inelegantly have been called, may or may not be a matter of great importance to the individual. One might raise a question regarding their being really a normal physiologic occurrence, as they frequently are considered to be. If we assume they are normal and necessary, then we must conclude that the individual who gets no other sexual relief and yet has no involuntary emissions, is abnormal and lacks an important physiologic relief.

There really is nothing in our knowledge of the sexual physiology of the lower animals or of man to suggest that this is true. In the latter, at least, the seminal vesicles and, perhaps, the ampulla of the vas deferens unquestionably have the power of digesting and absorbing these fluids. It is a part of their physiologic function which they can carry out without harm to the individual and in which sudden periodic emptying is not a necessity.

Apparently, the most that we have justification for saying is, that involuntary emissions of seminal fluid do occur in seemingly normal individuals and that, if not too frequent, they do little, if any harm to them. One perhaps might go further and say that, even when such emissions are frequent, the harm done is to the nervous system and the mental processes and is not the result of the wastage of a so-called "vital fluid."

Though not of necessity a normal occurrence in the male, they are by no means an unusual occurrence, and treatment of them requires a thorough understanding of many of the factors at play in their production. The first question that usually arises is regarding what may be considered a dangerous number of such emissions. Here, one finds it very difficult to draw the line owing to the varying amounts of psychic and nervous disturbance experienced by different individuals. The nearer the patient approaches that realm of instability that we have denominated "neurotic," the more profoundly will he be influenced by even an occasional involuntary emission. And, as much of this influence is caused solely by mental attitude, one finds, as should be expected, the widest of variations in the results of such occurrences. What produces no appreciable change on one patient may carry the other almost to the point of nervous and mental breakdown. It is because of this that the problem often becomes one of

the greatest importance to the physician. Even in the milder cases the need for orientation and mental guidance may assume considerable importance.

In the consideration of any subject there is always a crying need for the establishment of some basis for comparison, some standard as it were. And in this event one does best to find his standard of how much human beings who show no neurotic tendencies can endure in the way of such emissions. Having established such standards, he then safely can view exaggerations beyond them as the result of the neurotic tendencies of the individual in question. Also the physician must know a number of other things upon the subject, and the occurrence of involuntary emissions is so common that many things stand out quite prominently, so prominently, indeed, that they almost can be recited as rules for what we call normal males.

1 Many perfectly normal individuals never have involuntary emissions at any period of their lives.

2 Most normal individuals do have them at some time.

3 They are more common in youth and early adult life.

4 They are rare in individuals who indulge in normal sexual congress at intervals commensurate with their own ideas of their sexual needs.

5 The intervals at which they occur show the widest of variations in the same and different individuals.

6 One is safe in assuming that such an emission occurring not oftener than once a week in a healthy individual denied other sexual relief needs no treatment unless it is producing too profound a psychic impression.

7 An individual habituated to regular sex relief frequently has involuntary emissions for a time if such relief is suddenly terminated.

8 While this applies to the cessation of normal sexual relations it applies in even greater degree to the discontinuance of masturbation.

9 Comparatively few individuals experience frequent involuntary emissions for any great length of time without systemic or psychic symptoms.

10 The harm accruing from frequent emissions is primarily exhibited in the nervous and mental functions, more frequently the latter.

As one turns to the causes of such emissions he finds that, unlike most other common sexual derangements in the male, he must take into consideration local, neurogenic and psychogenic factors. Unquestionably, the point of origin of this involuntary expulsion of fluid may be either in the mind, the spinal cord or the posterior urethra itself. It may originate in the subconscious mind in the form of a dream, which dream may, or may not be a response to the conscious courting of sexual thoughts during the waking hours. Again, the nervous stimulation may arise as the result of congestion or true irritation in the spinal centers. Or, the activating influence may, and commonly does lie in the posterior urethra, where it evidently exerts its influence through nervous impulses resulting from irritation of the verumontanum.

It is also apparent that there may be set up a vicious circle wherein the cause may rotate from one to the other point by virtue of a reduction in inhibitive control or a stepping up of the sensitiveness of the process. For it is obvious that these emissions show a tendency to increase in frequency if the patient's nervous or mental poise becomes less stable. This is as

should be expected in so complex a mechanism; for which reason the physician should not think he has gone all the way when he has removed a source of irritation from the posterior urethra. He has a duty to perform toward the mental and nervous stabilization of the patient as well as to his urethra. Thus, it can be seen that the clinical picture is in no sense a narrow one, for it has to do with both mind and body.

In the milder grades of the condition the therapeutic call often does not extend beyond the need for an understanding upon the part of the patient. Particularly is this true in those individuals who experience an emission every week or two. For them, much future anxiety may be avoided if the physician takes the trouble to apprise them of the fact that occasional involuntary emissions are so common as almost to be considered normal and that they do no harm unless the patient worries about them.

This plan applies with equal force to those individuals who experience nocturnal emissions upon discontinuing regular sexual intercourse or masturbation. In them, Nature, as a rule, rather quickly strikes a normal balance unaided. Occasionally other means of relief may be required.

In the more severe cases and, at times, in the milder cases if the symptom persists, the physician should assure himself of the absence of pathology in the posterior urethra before expecting too much from psychotherapy or hygienic corrections. For neither of these will produce a cure if the exciting cause is in the posterior urethra. True, slight improvement and, at times, a brief cessation may result from the use of sedative drugs in such cases, but quick or permanent relief rarely takes place so long as this local source of irritation is allowed to remain.

Most commonly, the local cause is intense congestion of the mucous membrane of the verumontanum or posterior urethra, or both. The presence of a large number of urethral cysts or a urethral growth, also, may cause sufficient nocturnal irritation to the verumontanum to precipitate one or more emissions in quick succession. These conditions cannot be determined without a careful visual study of the canal.

Mucosal congestion may be reduced either by prostatic massage or more quickly by the topical application of from 5 to 15 per cent silver nitrate solution. If the verumontanum alone is in difficulties it may be lightly and carefully touched by a cotton applicator carrying 50 per cent silver nitrate. When carefully done upon only one occasion this, usually, immediately checks the emissions for several weeks or more. If they recur the treatment may be repeated. Rarely are more than one or two treatments necessary.

Urethral cysts may be removed by electric fulguration or by the topical application of 50 per cent silver nitrate solution. If done with extreme care this latter causes no permanent damage to the mucous membrane of the posterior urethra unless it is repeated too often, or too wet an applicator is used. To make such applications without doing damage to other structures requires much skill in the use of the endoscope. Less harm will be done in unskilled hands if the cysts are fulgurated.

In all patients who are the victims of too frequent nocturnal emissions attention should likewise be given to certain hygienic precautions. Sexual excitement and erotic thoughts and literature should be interdicted. The patient should sleep on a firm mattress and should not be too heavily cov-

ered. He should avoid sleeping on his back. It at times is wise to tie some solid body between the shoulders to prevent his turning onto his back during sleep. Aside from this stimulants at night should be avoided. Constipation should be combated and such general or medical measures taken as his general health and nervous condition may indicate. Above all every effort should be made to remove any element of fright or anxiety. For the patient who has experienced many such emissions over a long period of time frequently has a narrow threshold of psychic balance and for him a neurotic state or a fixed psychosis may be just around the corner.

**Coitus Interruptus**—Among the most interesting patients who reach the urologist's office are those who for many years have practiced withdrawal as a means of preventing conception. This protective measure has been in vogue for countless centuries probably since the first woman objected to having so many babies. We even find one of our Biblical characters being labelled a wicked man because he threw his seed on the ground. If the practice were highly harmful to the male from a physiologic standpoint it is difficult to understand how mankind has survived its supposed ravages. That the earth is rather well peopled today would of itself tend to cast grave doubt on the great harmfulness of the practice.

Singularly enough practically all the patients of this type who reach the urologist come from the neurologist's office and they all belong in one category. Almost without exception they give a history of a former nervous breakdown and never are of forceful character. Also they rarely indulge in coitus more than once a week often only about once a month. To a man they are abused worried serious minded individuals with little capacity for seeing that there may be some joy in just living. This should cause the neurologist to look elsewhere than in the posterior urethra for the results of a practice that draws no reliable picture there. There are other fields of investigation of these individuals more likely to reveal the true status of affairs and these are in his own specialty and not in urology.

It is usual that such a patient is accompanied by his wife to the urologist's office or perhaps it would be more correct to say that she brings him. She invariably is the dominating member of the matrimonial alliance and he—just takes his orders.

It is fortunate for the urologist that the character of his work serves to separate the two during his study for in her presence the real truth is not to be gained. If alone and given an opportunity he readily unburdens his soul regarding his sexual difficulties. He weaves a pathetic story of himself as a beggar at the shrine of Venus instead of a worshipper. His sex desires are not understood by his wife she is entirely out of sympathy with what he deems his needs. She limits his indulgences and is none too cooperative when she does submit. She shows plainly how repulsive the whole affair is to her and she shivers at the thought of pregnancy. And so the story runs on until it is a simple matter for the thoughtful urologist to sense what it is all about.

One has no difficulty whatever in realizing that the patient is really consulting the urologist with the hope that he will find some dreadful consequence of the practice. And he knows it must be dreadful before his wife will change her ideas and her ways. His one idea of real happiness

is normal intercourse. He has not the moral courage to gain his ends at home, nor to go abroad, and ardently hopes his medical advisers will grow so worried about him that they will make his wife see what, to him, is the light. More often than not she has so fixed a mind that she is not blinded by its glare, if she does see it.

In a sense, he is a malingerer, but he is, perhaps, more to be pitied than censured. He is badly in need of a proper sexual orientation, for his brooding has accentuated his supposed sex needs above most things in life. Rarely a very strongly sexed animal, he is attributing everything that ails him to the fact that his pleasures are somewhat interfered with. He is only too glad to think that this "unnatural practice" has done him grave harm, for he sees in it a way not only of gaining what he wants as he wants it, but, often, of taking much of the discord and turmoil from the home circle. He needs a friend and it often is possible for the physician to clear the atmosphere.

In these days of rather common knowledge regarding methods for the prevention of pregnancy that do not require withdrawal on the part of the male, it would seem a simple matter to banish the wifely fears. One does not need much experience with such women, however, to discover that this fear usually has been made much of in order to avoid something distasteful, as well as to enforce a method of contraception. Such marital maladjustments usually go deeper than the mere matter of sex indulgence. They have to do with such questions as love, female dominance, an assortment of repulsions and a male too meek of spirit for the marital milieu into which he has been lured or has plunged.

At best he is almost a sexual weakling, with a nervous system far from attuned to the storms of frequent indulgences. It is difficult to see how such an individual could magnify these widely spaced smudges on Life's picture to the point where they dominate the whole scene. To sense the reason one must go back to the patient's childhood and see just how many complexes he has held that should have been left on the lower rungs of Life's ladder. For he is really pouting and whining because he cannot get what he wants.

To view him solely as a psychoneurotic may be correct from a diagnostic standpoint, but it does not get the patient anywhere. No amount of psychotherapy will banish his fixations and the shortest way out is to help him get what he wants, for he will be no comfort to any one until he does. It is surprising to see how quickly his "nervous breakdown" mends itself if he grasps the "moon of his delight." True, he is prone to develop some other mental fixations, but a changed attitude upon the part of his spouse will at least erase the sex fixations. A knowing wife easily could do this by pretending sex wants just a little beyond his appetite or powers of fulfillment. The physician is merely a means of getting such patients the thing they have not the courage to demand.

**Coitus Prolongatus.**—While the practice of continuing sexual intercourse for great lengths of time cannot be called a true sexual disorder, this habit, if continued over any great length of time, may be the cause of a temporary sexual impotence. Certainly, it causes very definite symptoms that are highly puzzling to the physician. Until recent years this

practice belonged largely to members of the colored race. Within the last decade, however, increasing numbers of their white brothers have learned the art and are practicing it.

It seems not to be generally known, but it is common practice among Negroes to continue the act of intercourse for one or more hours. Not only this, but many members of that race can have one or more orgasms without the loss of erection. In the white race this gift, ability or whatever it should be called, is an extremely rare quality. In them orgasm generally concludes the act.

If this habit of prolongation is continued over a period of years it not only writes the easily readable cystoscopic pictures described in the section on Cystoscopy under the headings of Habit Bladders, and Minor Changes in Intravesical Contour, but it introduces urogenital symptoms. The course of these events runs about as follows. There is developed a sensation of heat and discomfort in the trigonal and suprapubic regions associated with a slight diurnal frequency of urination. These symptoms gradually increase somewhat in severity and the patient finds it necessary to arise one or more times at night to empty his bladder. Following these voidings he has so much vesical discomfort that he finds it difficult to go back to sleep. He soon learns that slight traction on the genitalia gives enough relief to allow of sleep. He then pushes the penis and scrotum down between his flexed thighs, places them together and, lying on his side, he carries his thighs slightly from his trunk until he gets the proper degree of traction and, then, goes to sleep.

He gets a better night's sleep after he has sexual intercourse. Consequently, for a while he seeks relief in this way. Gradually this loses its charm and, being rather tired sexually, he desists to some extent. Sooner or later he discovers that he is losing his sexual vigor. At times, he fails in getting an erection. Having sex rather prominently in his mind he applies some manual encouragement to overcome this deficiency. Later, he commonly gains his sole relief from masturbation largely because he has disappointed his partner so many times that she has become entirely disinterested in the matter or has gone elsewhere for what home lacks.

He may consult his physician first for his frequency and his vesical discomfort but, saying nothing about his sexual practices, he is just another puzzling case that is slightly relieved by bladder sedatives but fails to get well. Later he seeks help for his impotence. It is then that he becomes both a psychic and a physical problem. Yet, even then, he fails to tell his physician about his former practice. He really needs a sexual rest but there is little that he tells that would suggest such a thing—his story sounds like nothing but rest. Also, he needs to know that, aside from his temporary sexual weariness and the mental fixations he may have developed, there is nothing wrong with him sexually. If he gets the entire matter out of his mind for a few months he will find himself thoroughly capable of starting the journey all over again. He should be warned against his old practices, however, for he no longer can indulge in them without paying the price in discomfort, loss of sleep and, probably, another attack of impotence.

So far as his vesical discomforts are concerned, a few potassium per-



manganate irrigations, or instillations of 2 per cent silver nitrate solution into his bladder relieve them, and a course of prostatic massage keeps them relieved.

**Masturbation.**—So many disquieting things have been said about the effects of masturbation that there rests in the minds of a large proportion of the laity rather a fixed belief that, if even moderately indulged in, it is productive of harm of a permanent character. Not only is this true of the lay mind but it is obvious that not all medical minds are altogether settled about the matter. Our forefathers in medicine went to great lengths to describe the supposedly characteristic facial expression and conduct of the confirmed masturbator. And they, even more dramatically, outlined the supposedly dire results of the practice.

Much that they said has lived in the popular mind and has been productive of far more harm than has the habit itself. There is a lingering conviction that masturbation may influence the mental processes to the extent of true psychosis. There is the belief that it surely leaves behind it some permanent impairment of sexual possibilities. It has the reputation of undermining the "moral fiber" of its victims, making them neurasthenic, neurotic, and of doing untold harm in various ways.

Just how the world could have built up these ideas about a practice so universally indulged in is difficult to understand in these days. If, however, one carries his mind back a few decades in medicine he will have little difficulty in understanding how things got such a false start. At the beginning of the century we heard much of such conditions as neurasthenia, for instance. And it was the custom to search for causes among patient's habits and symptoms. If it could be established that the patient masturbated, it mattered not how seldom, masturbation got the credit, or discredit, for being the cause. Or, if what we know now as a mentally retarded child was caught masturbating, the medical mind immediately reversed the effect of the retarded mental development and called masturbation the cause.

Even the names by which the act was called in those days, and often in these, were enough to cause the masturbator grave concern. He can find nothing comforting in the terms, solitary vice, vicious habit, demoralizing indulgence, evil practice, sexual abuse and a host of others. Nor can he gather much reassurance when he reads, "The assertion may be safely made that every man who has ever masturbated to any extent has forever lost, to a greater or less degree, his capacity for sexual enjoyment, and the same is true of women." One would think that the memory of the boyhood experiences of those who invented such terms or held such ideas would have made them blush.

As the result of this orgy of frightfulness, those who sought help and advice for the habit were further frightened by a recital of all the dreadful things that would happen to them if they did not at once discontinue it. Some stopped but retained the impression that permanent harm had been done that would mock them in after years. Others of a more daring frame of mind continued to flirt with the "vice," perhaps surprised that they continued to live and failed to develop insanity. On the whole, the method of stopping a pleasurable habit by the calling of names or the prediction of disaster was none too successful. Either it caused mental fixations that

made the habit worse or that made the patient worse if he did discontinue the practice

Gradually, it began to dawn upon thoughtful men that more harm was being done by the general attitude toward masturbation than masturbation ever did of itself. A few recalled that their own indulgences had left no permanent marks of which they were aware, they lived, indulged sexually, procreated and celebrated as other mortals did. There arose a suspicion that perhaps much of the general attitude was bugaboo. And as time went on, it began to be sensed that humankind found it easier to discontinue habits of the sort if the habits were not made too much of. Instead of a campaign of frightfulness and verbal prohibitions, sanity and truth began to prevail.

The whole understanding of the problem and the efforts toward its control underwent a change. So that today the thoughtful physician avoids both ridicule and fright in the handling of such patients. He approaches the matter from an entirely different aspect, realizing that he is dealing with a psychologic problem with a physical reflection rather than the reverse. It has no moral angles for the physician.

It is probable that few, if any, normal males pass through life without some masturbatory experimentation. Just how many females do will always be a moot question. The normal minded male who indulges for any length of time almost always discontinues the practice as manhood approaches. Some never stop it altogether, comparatively few ever practice it to excess. On the other hand those of unstable or undeveloped mentality not unusually become excessive masturbators. Whether they are secretly or openly so depends upon the type of mentality.

Regarding the influence of masturbation upon the normal mind there is a grave doubt if it directly does any harm to it. If there is any change in mental processes it is born of an anxiety state because of indulgence in a sex outlet that has been supposed to do great mental harm, and is not the direct result of the masturbation.

In contradistinction to mental changes, one would hesitate to say that masturbation does not at times cause nervous changes. For the nervous explosion of orgasm often repeated nor unusually registers its influence upon nervous stability. The more delicate the nervous balance the more easily influenced it may be. One however, would do well to search for other explanations than masturbation, for the interrelation between heart and mind is such a close one that the nervous instability is more likely to be due to conflicts between them than to an occasional masturbation.

While some forms of masturbation may produce in the female some local changes of a permanent nature, there is a very grave doubt about its ever doing so in the male. In fact the only observable change in the male genitalia that can be attributed to masturbation is a congested condition of the verumontanum and the mucous membrane of the posterior urethra. And both of these spontaneously correct themselves if the habit is discontinued. During the continuance of the habit they may produce a mild degree of erethism that serves to attract the patient's attention to the parts and, perhaps encourage a greater frequency of indulgence. If the practice is stopped, this congestion may serve to cause nocturnal emissions which decrease in frequency as the congestion subsides.

What changes, if any, take place in the sexual ability of the male who has been addicted to the habit are to be attributed to his psychology and not to the local or spinal cord effects of the masturbation itself.

In small children, what commonly is called masturbation is not true masturbation. It is the pleasurable sensation derived from gentle titillation and unaccompanied by the nerve storm of sexual orgasm.

Aside from the mental guidance of the masturbator, care should be taken to remove all sources of local irritation to the genitalia. The performance of a circumcision, at times, not only reduces local irritation but breaks the habit by the enforced rest it brings about. The avoidance of constipation, too warm clothing, too sedentary an occupation, sleeping on the back, and the reading of erotic literature is highly necessary. Few things succeed better than a tired body in taking the mind from such sex outlets. Attention to the general physical condition of the patient also is of prime importance. One usually meets with more success among the youthful devotees of the practice if he ignores the supposed physical or mental aspects and informs his patient that it is decidedly unmanly but if he wants to be unmanly, it probably will not do him any great harm. Above all things he should convince the patient that he cannot possibly injure his mental faculties by the indulgence.

Youth does not travel far in these days before it gathers the idea that humankind must have some sex outlet if it would reach proper mental development. A boy, thus convinced, sees but one other direction when told that masturbation is extremely harmful to him. And, while sex congress in youth even has its adult endorsers, it is perfectly obvious that the latter have not spent much time in an urologic office. Nor have they had much experience with youths of the more diligent type in whom ambition to reach a place in life has been stirred and acted upon.

Thus it will be seen that in normal children and adults, masturbation, in the main, is a rather harmless pursuit so long as the anxiety states that a lot of terrible talk may engender do not enter the picture. When they do enter it the therapeutic call is to the psychic condition and not the masturbation. To attempt to frighten one out of the habit may produce unfortunate results either to himself or others. Turned by fear from the more personal outlet, which, at the most, can be productive of little harm to himself, the masturbator may become one of those predatory hunters who do little good to modern society. Or, if divetted from his own methods of sex outlet, he may become a victim of psychic fixations that otherwise would not attend. It is human to want most what one is told he must not have.

Masturbation in adult life seldom is a matter of great moment to the physician except in those of recognizably abnormal mentality. At times, it becomes a factor in the married men whose indulgences are kept at low ebb through the fretfulness of an unresponsive partner or for some other limiting influence. The outstanding feature in such of these patients as consult the physician is an abused mind and not a starved sexual system. And, because the matrimonial venture of such males is very definitely tottering, the complication should not be viewed lightly. There are but two types of males who seek this means of relief to marital maladjustment: those stronger creatures in whom the sense of decency is highly accentuated, and

those less hardy ones who lack the courage to go elsewhere for the sex relief they are sure they need. Both are heart-sick and mind sick and both need a friend. Seldom can either be tempted into the idea that sex could not be of so great importance as it appears to them. They have a mental fixation of abuse by one who has promised to love honor and, perhaps, obey, and who has failed to make good. No amount of argument will change things unless, perchance, the wifely attitude can be corrected. Undoubtedly there are two sides to these questions of maladjustment but they both are well worth efforts at correction, for few things produce more world unhappiness.

**Homosexuality**—As society grows more tolerant about sex discussions one hears more about homosexuality and we are finding that we have a greater number of such persons in our midst than previously was supposed to be the case. Some of them even have taken to the writing of books to justify their difference from others. Others, of late, have gathered up sufficient courage to consult physicians about the Well of Loneliness in which they dwell. Not that any great number of them have an overwhelming desire to be rescued from the 'well,' but that they commonly have hungry hearts that crave sympathy.

However, there do occur instances wherein the physician is consulted in great good faith by some individual who finds himself utterly unable to mustet up any great longing for the opposite sex. Some of them have allowed social custom or family influence to plunge them into paths that should lead to matrimony and, yet, feat to go further because they can not make the step from respect and admiration to love. Some of them admit to a greater fondness for members of their own sex, while others have not become consciously anchored in that field.

As with other things there seem to be varying grades of homosexuality which range from individuals with an inability to sense the feminine appeal to those who are steeped in an ocean of masculine affairs. And it is possible that the time is here when we shall have to take a different view of some of them than generally has been held.

Throughout the years they have not excited great medical interest to the end that much in the way of therapy has been tried. The demonstration by Wright that there is in some of them, at least, a reversal to the feminine type of hormonal urinary excretion should do much to increase medical interest in the problem. For there is in such a concept the suggestion that the common attitude toward them was not always as highly justified as it seemed to be. Certainly, many individuals fail to go on to full development of one secondary sexual characteristic or another. And it is by no means impossible that we often have attributed much to individual intent that we better might have attributed to an unfortunate lack of proper psychic development. For it is outstanding that one of the most important of the secondary sexual characteristics is the development of the male mental attitude. One could fail in this respect just as many fail to develop the male characteristic as to body hair, descent of one or both testes, or in other things.

Life, as we see it is a series of stair climbings in which one is supposed to leave on the lower steps things inappropriate to the upper ones. There is a constant tendency to fail to do this to carry into youth and even adult

hood things that are appropriate only to childhood. Considering that on the lower steps of Life's climb we are all homosexual, and rarely begin to show any great attraction for the opposite sex until we have made quite a few steps upward, it is only natural that some few should fail to throw off this childhood homosexual tendency. Also, it is more natural that the weak, affectionate child should hold more tenaciously to his childhood attitude. And one should expect to find among homosexual individuals a larger percentage of poorly nourished, poorly developed individuals than would be found among those who had followed the natural trend of human events and left their homosexual tendencies in that period of life where they should be left.

At about the time this change in outlook should be taking place that great change, puberty, is in the life picture. And it is more than possible that there is need that we go further than we formerly did in trying to overcome childhood traits. It may not be enough to try to encourage this change by urging the timid, fearful boy to take an interest in the opposite sex. True, such things are eminently needful, but there may be an equal need for us to pay close attention to the endocrine system in that we carefully watch for even the slightest suggestion of a failure to develop any of the secondary sexual characteristics. So far as the administration of gonadotropic hormones is concerned, there is ample evidence to support the belief that their value decreases rapidly after even a fair number of the secondary characteristics have been instituted. If there is need for them, there is every reason why it should be attended to before the life pattern is too firmly fixed. Far too often for great satisfaction such administrations after this partake more of the nature of replacement therapy and what gains are made by them commonly last only as long as they are continued.

Thus, it would seem plausible to think that at certain stages of life much might be done that at later stages would prove fruitless. For it is hardly to be expected that one could by such measures rescue the confirmed homosexual from his sea of sentimentality and fantasy. Indeed, it is seldom that he has a real wish to be rescued, as has been said.

In such an individual the stimulation of a sense of shame does more harm than good. He has been through that with himself and, often, has made strenuous efforts to change his viewpoint and failed. Being an individual whose life is spent in sentimental extremes, he has made strenuous efforts to rationalize his peculiarity. Criticism makes him furtive, in a sense antisocial, and it is only among his own kind that he finds even a small measure of real peace. Sympathy thrills him almost to the point of tears. Psychoanalysis is his special playground. He has almost an insatiable appetite for it and, usually, it gets him mostly nowhere. At times, he seems to develop the will to change, but is soon lost in a welter of psychic instability the ruling passion of which is just one more affair. Seemingly, many of them get much relief from the writing of "life histories" for physicians and others. At least, one would judge this to be the case from the numbers of such effusions that have reached print. Some even turn to poetry, and a few have reached attractive heights in that field.

## SECTION ON CYSTOSCOPY

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### CYSTOSCOPY

**Cystoscopy and the Cystoscopist**—Cystoscopy is a diagnostic art wherein we are not interested simply in pretty pictures. Yet, in the teaching of cystoscopy one of the greatest obstacles to overcome in the student is a tendency to linger at the stage of picture fascination. The human eye takes kindly to red in its various shades. It is prone to feast itself upon the beauties of cystoscopic pictures and is slow to take the plunge into the things beyond these pictures it sees, to find reasons why they are as he sees them.

The student is loath to spend any more time in a consideration of the bladder itself than is necessary to fit him to find the ureteral orifices and pass instruments into them. In consonance with the lazy mindedness of the age, he usually slights the most interesting part of the art and travels quickly to the upper urinary tract where diagnosis has so many aids as to have approached almost to the stage of mathematical certainty. He longs to make diagnoses of hydronephrosis, kidney calculus, hypernephroma and all of those things that lead the patient to the student altar, the operating table. He seems entirely unaware of the fact that where one urologic patient requires surgery, at least some hundreds do not. He fits himself for good diagnosis on the one case and rather mediocre work on the others. Then he complains that not a tenth of the cystoscopy is done that should be done, and he wonders why.

It must be admitted that only a fraction of the cases in which careful cystoscopic diagnosis would be of the greatest benefit to the patient ever get a cystoscopy. Today, about thirty years after cystoscopy really became a thing of reliability and value, it seldom occurs to the practitioner that such a study might reveal the true cause of his patient's urogenital discomfort or disease, unless the patient is so dramatically affected that he almost asks for such a study or there is little else that can be thought of. Thus, many patients drift into dramatic situations that, often, could have been discovered years before. A far larger number have to find out how to live with their minor discomforts or are fortunate enough to have them disappear as the result of blindly applied treatment or the kindness of Time and Nature. A good number become what we of the urologic persuasion have deigned to call sexual or urogenital neurotics, totally losing sight of the fact that many of their mental fixations have a physical basis that we have failed to discover.

If, for the good of mankind and the better reputation of ourselves, this situation is to be corrected it will come only as the result of a conviction that the grass in the near field is just as green as that in the field further up. Instead of "leaping to the heights that were made to climb," we must demand more of our students and ourselves than just the ability to make a

diagnosis of renal and ureteral lesions or to be able to solve the reasons for only the gross and striking things within the bladder.

Unquestionably, there should be developed the utmost familiarity with the bladder and urethra in both health and disease, for, beyond a doubt, there are intravesical pictures written that, so far, no one has read. We must see in the bladder what the artist sees in a painting. He is not satisfied with a fleeting glance, such as the bladder so often gets. He analyzes things from every angle before he is ready to pass an opinion upon the painting. His eye does not pick out the reds in admiration, he looks beyond until he almost reaches into the mind of him who painted the picture and senses a hundred things that are lost to the untrained eye. How much the cystoscopist could learn from him! At least, we could make ourselves worthy of studying those thousands of patients who do not need operations and who never get a cystoscopy.

The skilful, sensible use of any valuable diagnostic procedure creates a demand for it. There, of course, may be some mitigating circumstances that make those who first see the cases rather hesitant about advising them for their patients. With the art of cystoscopy, aside from the things previously discussed, there have been many things that have engendered in the mind of the practitioner the idea that cystoscopic study is a last resort, rather than a procedure that is likely to be of use in many of those minor urogenital complaints that make life so unpleasant for the patient and which, in their persistence, do not always shed glory on the doctor as a curative agent. The fact of the matter is that there is a number of things that are standing between cystoscopy and those countless individuals who need it. And they will continue to stand there until the urologist not only tells, but proves to the practitioner the great value and usual harmlessness of cystoscopy. It is worth endless effort to erase these mental hazards.

There is a conviction in the minds of most practitioners of medicine that the performance of a simple cystoscopic study is an ordeal so unpleasant, painful and carrying with it such dangers that one should hesitate a long time before he advises his patient to undergo it. Unfortunately, the heavy-handed technician has done much to bring this about, for, despite his local anesthetics, his ministrations often have been extremely painful affairs for his patients. A bit more gentleness and much attention to the patient's apprehensive state would correct this impression. There is no reason why cystoscopy should be any more painful than the passage of a urethral sound, a procedure for which even the most inexperienced seldom use any type of anesthesia. There are cases, of course, in which any urethral or bladder procedure is sure to cause pain, but these almost always can be recognized beforehand.

Many physicians have never seen a cystoscopy performed and have only the most vague ideas of what can be accomplished by it. They are so used to the idea that instruments for introduction into the bladder should have the Thompson curve that they automatically rebel at the shape of the cystoscope. They have no idea how easily a perfectly straight instrument can be passed into the bladder by a skilled manipulator. A few invitations for general physicians to visit cystoscopic clinics should overcome much of this.

There is great lack of general information regarding the wide range of conditions for which cystoscopy is indicated. And there is slight concep-



tion of the extent to which this procedure can change urologic guesswork to certainty and place treatment on a scientific, rather than a haphazard basis. This unfortunate state of affairs should be overcome by efforts toward the education of the general profession regarding the value of the things that have become almost matters of routine with the urologist.

Finally, there is the belief that there are a great many contraindications to cystoscopy, and an honest tendency to consider minor things, that are in no sense contraindications, as reasons why a particular patient should not be studied thus. On all counts we owe much to those in general medical practice or in the other specialties, not the least of which is a fund of knowledge of the true state of affairs that does not leave them in a position where, in all honesty, they may deny their patients so valuable a means of urogenital diagnosis.

With attention to these things there is some chance that the art of cystoscopy more quickly will come into its own than is likely to occur if we follow the course of the last twenty five years. Particularly, we must look to ourselves to the end that the opinions we give are not alone of value to those cases that need surgery but are of equal value to that far larger group of patients who offer us an even greater challenge. If we can solve the reasons for their mysterious frequencies of urination, their burnings, their perineal, urethral and rectal discomfort or pain, if we can relieve them of these and the demoralizing mental fixations that so commonly attend them then, and only then, shall we have reached a position in the art that can be viewed with pride.

**The Cystoscope**—So great have been the advances in the development of cystoscopes in this country, that one does not feel compelled, as did the earlier writers to describe those of foreign make. Today the German made cystoscopes, while they may, at times excel in clearness of visual possibilities, come far from having the range of utility of the American made instruments which, to an interesting degree, are being used in European clinics.

When the beginner in cystoscopy is faced with the wide range of instruments at present on the market, he is prone to gasp at the seemingly needful cost of the armamentarium he thinks he must have. If, however, he is not dazzled by their brightness and appeal, but views them solely from the standpoint of the uses they are to fulfil, he easily can avoid much needless expenditure. For instance, let us suppose that he is not overburdened with that commodity called cash, but must fit himself to carry out his work where he cannot drop in to the instrument store for something to fill each unusual need as it arises, as can those in large cities. Under such circumstances his purchases should be based upon the work he is to do.

If he is going to confine his activities solely to diagnostic work and the simpler bladder procedures, he very definitely can reduce the initial cost of his outfit. If, on the other hand, he contemplates electric excisions of vesical outlet obstructions, which assuredly are not office procedures, he will need a far larger and more expensive cystoscopic armamentarium.

While those upon whom fortune is smiling may feel the need of a large assortment of cystoscopes one, in common sense, must recognize the enormously wasteful expenditures that have been saddled upon some institutions. Most of us can name such places wherein are exhibited instrument cabinets

literally filled with cystoscopes that probably never have and never will be used. What a delight such places must be to those who sell cystoscopes.

Most of those who take up the study of cystoscopy, are not in a position to be so prodigal, nor do they impose such wastefulness upon the institutions for which they are asked to outfit cystoscopic departments. To them, the great problem has to do with how little, not how much. And, when one is concerned with how little he can do with, he finds, to his surprise, that there are many beautiful instruments that he really does not need.

Let us start, therefore, with what might be called minimum requirements for an office wherein are to be carried out observation cystoscopies, ureteral catheterizations, the simpler intravesical procedures, such as the fulguration of vesical papillomata, the removal of small foreign bodies, and the like. For perhaps fifteen years the writer owned two cystoscopes. He had a Wappler operating cystoscope (24 F.) and a number 18 F. single catheterizing cystoscope. With these he did all of the cystoscopic studies that came to him and saw no reason to feel abused. He put two holes in a rubber catheter channel tip and had a fin made so that the catheters worked freely in the sheath when he wanted to do a double catheterization. Wappler appropriated the fin idea, attached three catheter channels to his lens system and the "convertible" cystoscope was born. No longer is one put in the position of buying one cystoscope if he wants to use the operating instruments and another if he wants to pass two catheters. With the convertible lens system he can do both with a single cystoscope.

With the single catheterizing 18 F. cystoscope all female children, most males above five years of age, and adults with a narrow meatus usually could be studied. Also, the 18 F. cystoscope is an excellent urethroscope as well, if used with the irrigating fluid flowing.

But back to the minimum requirements of today. If the writer were starting to outfit himself today, on a limited amount of cash, he would buy the following instruments:

1. A Brown-Buerger 21 F. convex sheath, convertible cystoscope.

He would add to this an examining lens system, and, if he could go further, he would add the cysto-urethroscopic sheath.

2. A Butterfield double catheterizing children's cysto-urethroscope.

With these can be done practically all of the office cystoscopic studies that are likely to be encountered. A McCarthy, foreoblique cysto-urethroscope is useful, but by no means necessary, and a Young's cystoscopic rongeur is highly valuable for the removal of foreign bodies and stones too large to be grasped by the small cystoscopic forceps. Such removals are seldom emergencies and one rather safely can delay the purchase of such an instrument until the need for it arises. The telegraph company and the cystoscope makers will assure prompt delivery.

A few years ago there was much discussion regarding the comparative values of the direct and the indirect cystoscopes, but today comparatively few continue to use the direct instrument. The indirect presents many advantages not found in the former and has a far wider field of usefulness. If, today, there is much difference of opinion it is regarding the use of the concave and the convex cystoscopes. The concave cystoscope seems to have found greatest favor among those who limit themselves to cystos-

ing fluid to run while the urethra is being studied one can with a little practice examine all except the anterior wall from 1 centimeter distal to the vesical outlet to about the anterior portion of the bulbar region. As there almost never is pathology upon this portion of the urethral wall this omission is rarely of great importance.

A study of the convertible cystoscope (Fig. 260) will reveal that it serves a wide range of usefulness for it has combined in one instrument both the operating and double catheterizing instruments formerly necessary. This is a fortunate circumstance for it has made possible by the single passage of the instrument procedures that formerly required that two instruments be passed often to the discomfort of the patient. And it has reduced the cost of the instruments required. It will be seen that the instru-

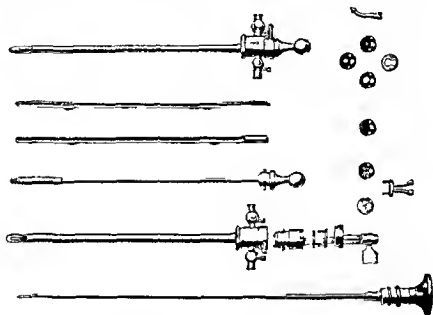


Fig. 263.—Stern McCarthy foreoblique cystoscope and its component parts

ment has three catheter channels one of which is sufficiently large for the passage of the larger ureteral catheters as well as the flexible instruments for many intravesical procedures. The smaller channels make possible the catheterization of both ureters. There also is an examining lens system affording a larger and better field for the visualization of the bladder and urethra than is to be had by use of the catheterizing periscope.

The McCarthy panendoscope (Fig. 263) is often a very valuable instrument. Not only can one make a better study of the vesical outlet and urethra with it but he can study with more ease that portion of the posterior bladder wall that is not so easily studied with the indirect cystoscope. He however cannot visualize any of the anterior bladder wall. It is a very difficult instrument to master and requires much skill if injury is to be avoided. It is the instrument necessary for electric excision of vesical outlet obstructions.

There are several excellent cystoscopes for use in the infant bladder

which are even as small in caliber as number 9 French. The catheterizing cystoscopes are a trifle larger. They carry either one or two catheters. With them, cystoscopy can be carried out in the youngest children with the same freedom from trauma as is possible in the adult.

Neither of the instruments mentioned lends itself to the topical application of medicaments to the dry urethra, for which reason one should have several sizes of endoscopes. Those with the internal lamp give far better illumination. But those with the external lamp, notably Young's, seem to have found most favor, as they are much simpler to use and, having larger lamps, they do not burn out so often. Also, no portion of the instrument channel is obstructed. Endoscopes usually come in sets of sizes 22, 24, and 26 French, and each has its use as human beings are constructed.

Aside from catheters, to be considered later, one's armamentarium should contain at least one pair of flexible cystoscopic forceps (the one with the cupped extremity is most useful), a pair of cystoscopic scissors and a good fulgurating wire.

With this limited equipment it is possible to carry out almost all of the common cystoscopic procedures, though one may find it necessary to add to it from time to time.

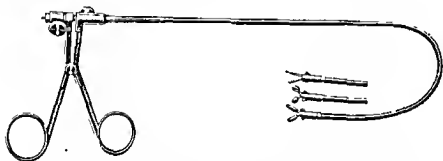


Fig. 264.—Flexible cystoscopic forceps, cupped rongeur and scissors.

*Sterilization of the Cystoscope.*—The frequency with which cystoscopes have been placed in boiling water for purposes of sterilization shows that there is need for a general understanding of the safe methods for their sterilization. One, of course, does not make this absent-minded error more than once. However, if the care of cystoscopes is delegated to nurses or office assistants, it is well to see that they understand that these instruments cannot withstand high temperatures. The fact can be made more impressive by the stipulation that the one who makes the error pays for the repairs. Under these circumstances there are no such errors.

Where a large assortment of cystoscopes is available, it probably is time-saving to keep them in one of the larger cabinets fitted for formalin gas sterilization. However, such a sterilizing method requires hours of exposure and does not lend itself to convenient use in most offices where the number of cystoscopes is limited to two or three. Under such circumstances, immersion sterilization is far more convenient and, probably, much safer.

The older method of sterilization in strong carbolic acid solutions was not without danger to the patient by virtue of the occasional difficulty of rinsing all of the carbolic globules from the instrument.

As has been cited in the chapter on the general sterilization of instruments, the writer places his cystoscopes and catheters in a formalin solution made by the addition of a pint of formaldehyde solution to a gallon of tap water. In this, they are allowed to remain for ten minutes or longer and then are placed in a solution of carbolic acid of a strength of 6 drams to the gallon of water. They are then ready for use without further rinsing, as this strength of carbolic solution exercises no deleterious effect on mucous membranes.

Care should be taken to draw formalin solution into the lumen of the catheters by suction with a hypodermic syringe, as they will not be sterilized otherwise. It is not necessary to do the same when the catheters later are placed in the carbolic solution, as the current of fluid from within outward when the catheter is inserted into the bladder cleanses them. It, however, is wise to discard the first portion of the catheterized fluid if cultural methods are to be used, as it does not take much formalin to exercise, at least, a bacteriostatic effect.

Owing to the irritating qualities of evaporating formalin, it is important that such immersion sterilization be done in covered containers. For this purpose one can use the ordinary enameled catheter trays that can be found at any instrument store. The shallowness of these trays is their only fault.

The writer uses two of the small obstetrical forceps-sterilizing trays which he has had chromium-plated (Fig. 32). These are about twice as deep as the catheter trays and are much more convenient. They lend themselves to the better transportation of sterilized cystoscopes and catheters for home uses, as they take up little room in a satchel and the lids are held in place well by the handles that turn down upon them at the ends of the trays.

The Randall-Moorhead sterilizing tray is a very useful one (Fig. 31). Despite the central dividing fin, the formalin gas has a tendency to work over into the rinsing solution. For this reason, the latter should be changed more frequently to prevent mucosal irritation from inefficient rinsing.

**Current Supply.**—While many really attractive outfits for supplying current for cystoscopic illumination are on the market, it is a very simple matter for one to make his own. All that really is needed are three ordinary dry cells, a 40-ohm radio rheostat, and some wire. The batteries can be placed in a box and the rheostat on its outside. Often it is more convenient to place the batteries in a box or drawer out of the way and run wires from them to a plate carrying the rheostat on the wall near the cystoscopic table. Such an outfit is seen in figure 265. The dry cells should be connected zinc to carbon.

If the illumination is to be used only for the regular cystoscope lamps, four cells can be used and seemingly last for a much longer time. If, on the other hand, the current is to be used for the McCarthy panendoscope lamp or other small lamps of like character, the 40-ohm rheostat is hardly sufficient for four dry cells and it is better to use only three.

Smaller, portable batteries and rheostats are made by many manufacturers. For bedside work or work in hospitals not properly equipped, these are invaluable. The small batteries used in them, however, have not nearly the longevity of the larger dry cells.

Many types of current controllers, also, are made for street current. But such a current supply often is so inconstant as to burn lights out quickly. This is particularly true in places where elevators or other things calling for much current run from the same circuit of electricity. Lamps adjusted during the times of heavier current drains are likely to burn out when the load is lightened.

Another objection to the use of street current for the lighting of cystoscopic lamps is that one is likely to forget to switch to battery current when he uses fulguration. Such an error results in a terrific electrical shock for the patient the instant the fulgurating current is applied. It is only necessary to have this happen once to make the operator turn to the sole use of batteries as a source of light current.

*Adjusting the Illumination.*—It is common custom for the beginner in cystoscopy to burn out many cystoscope lamps by giving them entirely

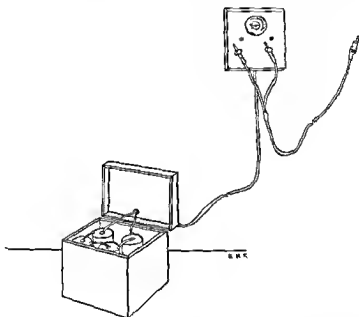


Fig. 265.—Battery box and wall plate containing rheostat and cystoscopic cord.

too much current. Much expense can be avoided by careful attention to this highly important detail. By gradually increasing the amount of current until the glare of light obscures the filament of the lamp and then turning the rheostat back until it is just possible to see the filament, a safety point will have been reached. At this point most lamps will withstand months of use if the current supply is a constant one, such as is obtained from batteries rather than house current.

Lamps often will last for great periods of time if used at the point where the scintillation of light just blots out the view of the filament. This gives considerably more illumination than the former method. It is better for the operator to accustom himself to the less intense light, however, for in this way he seldom is annoyed by having the light burn out with the cystoscope in the bladder. Strangely enough, these occurrences usu-

ally take place at the most embarrassing times. When the light burns out fate seems to see that it does so in the bladders of the most nervous or sensitive patients. After this has happened several times, the most casual of cystoscopists pays more respect to the matter. It is not necessary to have a glaring amount of illumination to study the bladder, and it is far better to accustom the eye to the lesser light values than repeatedly to burn out lamps. Also it is kinder to those by whom cystoscopy is needed.

**Difficulties of Illumination.**—The present cystoscopes are so constructed as to eliminate most of the lighting difficulties of former years. The sheath of the cystoscope serves as one "wire" and a small insulated wire is carried to the lamp end of the instrument in such a way as almost to preclude the possibility of its becoming broken or short-circuited (Fig. 266). Despite these perfections of arrangement, lighting difficulties do occur sufficiently often to give value to a careful study of the electrical arrangement and the ways in which the cause of the trouble can be determined.

The most usual causes of such difficulty rest in the batteries and their connections, the cord, the contact yoke of the instrument, loosening of the

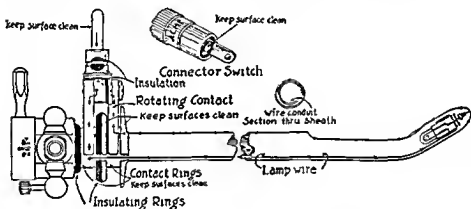


Fig. 266.—Schematic figure to illustrate the wiring mechanism of the cystoscope.

lamp capsule, corroded or poor contact of the central wire of the lamp, and burned-out lamp.

Should the lamp fail to light one does well to assure himself first that the proper contact is being made between the cystoscope and the cord. This being found correct, the lamp should be removed from the cystoscope and tested as in figure 267. If this causes the lamp to light, the difficulty rests in an improper contact between the side of the lamp and the lamp capsule because the lamp is undersized, or between the spring plate and the central wire of the lamp. The first can be corrected by inserting a proper-sized lamp or by placing a small piece of tissue paper on one side of the metal casing of the lamp so as to force the opposite side against the capsule. In the latter case, the central wire should be cleansed and raised, if the lamp is of a type having a free wire. The contact plate in the tip of the cystoscope should be cleaned and, if it is pressed in too far it can be raised carefully so as to stretch the underlying spring slightly. Great care should be exercised here to avoid tearing the plate loose from the spring.

If the lamp does not light when tested in the manner shown in figure 268 the circuit external to the cystoscope should be tested as shown in figure 267. Failing here it should be tested at the battery pole as shown in figure 269.

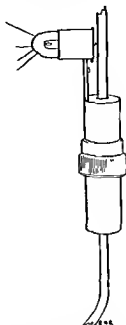


Fig. 267.—Method of testing the lamp by placing a metal object in the opening in the instrument contact of the cord.

*Bending of the Periscope.*—Bending or denting the periscope is not an infrequent happening. Such a misfortune makes itself evident by changing the round field of vision to an irregularly oval one. The normally circular

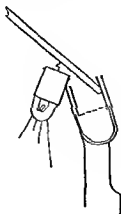


Fig. 268.—Method of searching for circuit fault in the cystoscope sheath.

field is encroached upon on one side and the inside of the metallic sheath becomes plainly visible as is shown in figure 271. Slight curvatures frequently can be straightened out with little difficulty providing one does not apply much force. It probably is better to let the manufacturer do



such things, however, as it is a simple matter for the unskilled to ruin an otherwise easily corrected misalignment

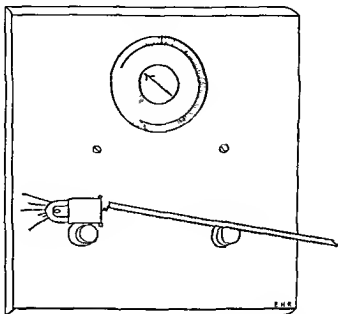


Fig 269—Method of testing the cystoscope lamp

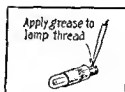


Fig 270

*Fogging of the Lens*—The unseating of lenses rarely takes place in cystoscopes that have not been placed in boiling water by mistake. At times, however, there may be a minute leak at the side of a lens that allows enough

moisture to get into the periscope to fog the lens. This has happened to the writer's instruments upon several occasions and has been very easily corrected without returning the instrument to its makers. The periscope has been placed in a bacteriologic incubator for several days and has been perfectly clear when removed. To avoid recurrence of the fogging, some of the wax used for waxing the thread of the instrument beak, a box of which comes with each cystoscope, was rubbed under slight pressure over the distal lens so as to get into any crevice in its seating. This invariably stopped the fogging. If, as rarely is the case, the fogging is at the ocular end of the periscope, that lens casing usually can be unscrewed and cleaned.

If these simple methods do not correct and prevent the repetition of fogging it is probable that there is a flaw in the periscope sheath and it had better be returned to the manufacturer.

**Tables.**—For cystoscopy that does not include x-ray study, it is not necessary that any special table be purchased, as any of the usual examining tables is perfectly satisfactory. Practically all these tables are sufficiently adjustable to give patient position of the type needed.

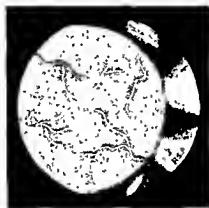


Fig. 271.—Interference with the visual field due to a slight bend in the sheath of the lens system.

If one prefers to stand while doing his cystoscopies it is a simple matter either to have the table legs lengthened or to place the table on a platform of sufficient height for the purpose.

Bierhoff crutches are an important feature for cystoscopic positions, though the rods should be of such shape that the leg rest is not too close to the end of the table. Otherwise, the thighs are at a right angle to the trunk and the perineum is put upon too much of a stretch for comfortable cystoscopy in the male. In the female this makes little difference.

To overcome the tendency of some patients to arch the lumbar vertebrae, one can have made a wedge-shaped pad to be placed under the buttocks in order to raise the pelvis.

Kretschmer does his cystoscopies with the patient lying flat on the table, with a mechanism for raising the buttocks and with the legs slightly apart and rotated outward. The buttocks also may be raised by a pad or sand bag. It is surprising how easily cystoscopy can be carried out in this position. The method is invaluable for some patients with ankylosed joints.

It probably is a position less embarrassing for women. Its greatest drawback is the strained position necessary for the cystoscopist, particularly if prolonged procedures are necessary.

If an x ray table is desired, there are many excellent ones on the market, each with its particular improvement on the others. A description of their separate advantages safely can be left to the orators who sell them.

**Ureteral Catheters**—Ureteral catheters are made in many different shapes and sizes, and it is advisable for one to have a good assortment of them owing to the difficulty encountered, at times in introducing those most commonly used. While the so called x ray catheters are higher in

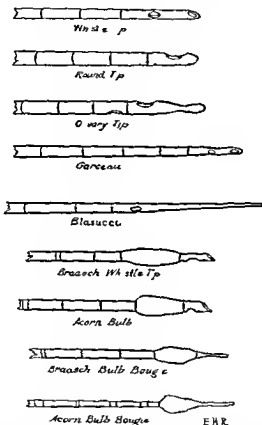


Fig. 272.—The various types of ureteral catheters in common use.

initial cost they far outlast the others, and are consequently much cheaper in the end. The life of these catheters depends almost entirely upon the care taken with them. The writer is still using catheters that have seen at least ten years of service, and are almost as good as when purchased. The longevity of them is to be attributed to the fact that he has relied solely upon formalin solution sterilization instead of boiling or autoclaving. It is probable that formaldehyde gas sterilization would have given them an equally long period of usefulness. Most of the catheters purchased at the same time that were not of the x ray type are gone or are about fit to be discarded.

The most commonly used catheter is the one with the so-called whistle-tip (Fig. 272). These seem to collect urine from the ureters much better than do either those with the round or the olivary tip, though the latter, at times, will pass up through a ureter better than will the former. Consequently, it is well to have in one's armamentarium at least one round- or olivary-tipped catheter of the several sizes. Aside from these a very good beginning assortment of whistle-tipped catheters would be two number 3 catheters, six number 6, two number 8 and two tapering (Garceau) catheters.

A number of other types of catheters have been devised for special purposes, but it is rare that one of the above will not answer the purpose. Those having a bulb are of service for locating ureteral narrowings. Waxed-tipped catheters, if properly made, can be used, though less efficiently, for the same purpose. They can be made by dipping a catheter tip into melted bee's wax or a mixture of 2 parts of dental wax to 1 part of olive oil. This can be poured into a bottle or test tube in which it quickly may be melted as required. The wax may be placed at the tip or just back of the catheter eyes. The wax bulb at the tip is better for the diagnosis of ureteral stone, for, often, the tip of the catheter will not pass a stone far enough to cause scratching of the wax when placed back of the catheter eye.

Bulb catheters for the study and dilatation of ureteral narrowing can be made by the use of the harder waxes employed by dentists. Before applying the wax, the catheter coating should be scarred or removed at the area to be covered with wax. Dentists make quite a good job of this and most physicians have such a friend who gladly will do it. It is an excellent use to make of old catheters.

**Vesical Dilatation for Cystoscopy.**—In order to secure good visualization of the bladder through the cystoscope, it is necessary that the viscus should have its walls pushed well apart by some clear medium, such as water or air. The medium generally used is sterile water at room temperature. Water used at higher temperatures is not good for cystoscopic lenses and renders catheters almost too soft for convenient use. Some have advised 1:3000 mercury biniodide solution or 1:5000 oxycyanide of mercury for the purpose, because of their mild antiseptic value, while others have advised boric acid solutions.

Macalpine quotes Wardill as suggesting liquid paraffin of a specific gravity of 0.860 in the presence of hemorrhage, because it does not mix with blood. Medicinal mineral oil as obtained in our drug stores, fulfills the requirement and is kind to the bladder mucosa. *Certainly, no efforts at fulguration should be carried out with such a fluid in the bladder.* Luys advises for cystoscopic dilatation a solution made up as follows:

Antipyrine 40 grams, 1:1000 solution of adrenalin 100 drops, distilled water 1000 c.c.

As has been said elsewhere, it is possible, by placing a patient in an exaggerated Trendelenburg position on a table having shoulder supports to hold him, to cause the entrance of enough air to act as a dilating medium. This position often makes sufficient upward pull of the viscera in thin patients to draw in enough air for bladder study. In the presence of bleed-

ing, the procedure is sometimes of value. The same purpose can be served by placing the patient in the knee-chest position as is done with the female in the use of the Kelly cystoscope. The passage of the cystoscope in a male in this position, however, is not an easy matter owing to the acute flexion of the thighs on the abdomen.

The present decidedly general use of the so-called irrigating cystoscope has relieved the cystoscopist of the older necessity of passing a catheter for the introduction of the dilating fluid prior to the passage of the cystoscope. Thus, he is able to study the bladder immediately as it dilates without the confusing bladder changes so common to catheter trauma. Also, it introduces a degree of flexibility not possible with the older method. If bladders all had the same carrying capacity and none of them contained pus or blood, catheter irrigation would not have so many drawbacks. Such not being the case, however, the ability to vary the degree of vesical dilatation or to change the fluids as visual needs require adds much to diagnostic accuracy. Carefully used, it also reduces the dangers of such studies.

There is great need that one pay as much attention to the degree of dilatation obtained as he does to his vesical studies. Not only does gross overdistention give needless pain or discomfort to the patient but it is easy of proof that most cases of postcystoscopic epididymitis and many cases of pyelonephritis are due to this. Particularly is this so in those to whom general or block anesthesia is given. Here, the avoidance of such intra-vesical pressures rests solely with the cystoscopist. In the absence of such sensation obtunding measures, the properly instructed patient can tell the operator when the danger point has been reached.

**The Indications for Cystoscopy**—The lack of danger in a carefully performed cystoscopy, providing no contraindications to the procedure exist, has made of it one of the most valuable diagnostic procedures of medicine. The accuracy of its findings in skilled and experienced hands is so great as to far outshine the value of urogenital diagnoses otherwise arrived at. This, alone, has brought it to the front and revolutionized the art of urology. The innocuousness of most cystoscopic studies has served greatly to widen the field, so that one safely may say that the procedure, with but few exceptions, is indicated in almost all lesions of the conducting structures of the urogenital tract that have grown to be recognized as within the special field of urology.

Cystoscopy, however, should not be viewed lightly, as it is a simple matter to occasion great harm by it, and it should not be performed without a careful consideration of its possible contraindications. The art has both a positive and a negative value, for it not only reveals pathology and abnormality, but is equally valuable in demonstrating their absence. With so complex a symptom producer as the urogenital tract, wherein trouble rarely travels alone, both features are invaluable.

Perhaps the greatest controversy regarding the indications for cystoscopy has centered around the question of prostatic hypertrophy. There are those who insist that it should not be done in any case and those who urge its performance in all. Unquestionably, both are wrong, for there are cases of prostatic hypertrophy in which cystoscopy is a menace. They, however, are very few in number and even their risk is derived not so much from the prostate as from the general condition of the patient. To

deny the rest the advantage of accurate diagnosis, just because a few have been cystoscoped who should not, is about as sensible as would be the discarding of diphtheria antitoxin because a few have died of anaphylactic shock following its injection.

By the perfection of smaller cystoscopes the field of usefulness of cystoscopy has been broadened greatly. Through its use in even the youngest of children, it has been shown that urogenital pathology is far more common in childhood than has been supposed, and many lives have been saved thereby.

Thus, there is no age at which cystoscopy is not possible and there are comparatively few individuals upon whom it cannot be done with safety. It, however, behooves the cystoscopist not only to choose the proper patients but carefully to select the proper time for each patient, if he would not cast great discredit upon the urologists' most valuable means of diagnosis. It previously has been pointed out that not more than a tenth of the patients who should have a cystoscopy ever get one and much of this is due to the dread implanted in the minds of physicians and patients as the result of cystoscopic misfortunes that easily might have been avoided. Heavy-handedness, also, has played a part in this too widespread attitude. If the urologist would overcome this unfortunate state of affairs and come into his own, he has much to undo and erase.

There is no sure way, other than by cystoscopy, to determine the source of pyuria that has its origin above the vesical outlet. Thus, when the two-glass test reveals that the pus in the urine is from the middle or upper tract, cystoscopy is urgently indicated in the absence of acute symptoms or other conditions contraindicating the procedure. In the presence of temporary activity of infection and of gonorrhea it should be delayed until conditions make it safe.

What is true of pyuria is also true of hematuria to even a greater degree. Hematuria from above the vesical outlet so commonly is due to some lesion of gravity that, to withhold such study, often, is to place the patient's life or health in grave jeopardy. Even where intravenous pyelography or other diagnostic procedures give undoubted evidence of upper tract lesions of a surgical nature, cystoscopic study is needed. It is not enough to say that a given kidney is the seat of a destructive lesion. There may be, and often is, as great a need to demonstrate the integrity of the supposedly well kidney upon which the patient's later life depends.

Aside from the study of the surgical lesions there often is as great a need for cystoscopic study as a means of searching for the causes of a host of misleading and annoying symptoms, the removal of which depends upon the treatment of their causes.

Thus, it is safe to say that there are a hundred indications for cystoscopic study to every contraindication for it. To neglect it is to satisfy oneself in most cases with the symptomatic diagnosis that every cystoscopist knows is more likely to be in error than otherwise. Indeed, it is outstanding that cystoscopy is indicated in all bladder and upper tract diseases and in the presence of symptoms of these organs whenever the diagnosis cannot be made positively without it and where no definite contraindications to its performance exist.

**Contraindications to Cystoscopy**—It is generally conceded that acute inflammations of the bladder offer a definite contraindication to cystoscopy. This rule however is not universally followed and its disregard has much to do with the disrepute that this most valuable procedure has borne in so many quarters. In the presence of chronic inflammatory bladder conditions cystoscopy commonly is borne so well that it is natural that there should exist a tendency to shift the safety zone almost to the subsiding acute cystitis. Usually it is far safer to delay such studies until all acute symptoms have subsided than to risk the distressing reactions that so frequently follow visual studies during the acute stages. As a matter of fact, there is no real need for cystoscopy during the acute stages of bladder inflammation. By the use of the microscope and other means of diagnosis it frequently is possible to determine the probable cause of the cystitis, and it always is safer to wait in those cases wherein such a determination depends upon the cystoscope alone.

In tuberculosis of the bladder giving severe vesical symptoms the word acute does not have the same implications as is the case with other vesical inflammations. Under proper pain relieving precautions one can study such a bladder without the expectation of a great increase of vesical symptoms thereafter. In fact he frequently will be surprised to find such a patient willing to have another cystoscopy solely because of the immense relief he had following the first one.

Aside from any local contraindication that may exist toward the performance of a cystoscopic study there may be systemic reasons why it is to be even more carefully avoided. For there are patients in whom cystoscopy may prove fatal. That such is the case was forced upon the writer's attention early in his cystoscopic experience. A patient whom he had cystoscoped one afternoon developed such a profound state of delayed shock about eight hours later that his life was saved only by the heroic and combined efforts of the wisest heads on the hospital staff. It was the patient's good fortune to have been a hospital case for if he had gone home after the study he most surely would have died. Strangely enough the cystoscopy was in no sense a difficult one nor was it prolonged. The cystoscope was passed into the bladder with ease the bladder wall inspected a grade I hypertrophy without residual urine was seen and the instrument withdrawn.

Several years later the writer was asked to cystoscope a dispensary patient of about the same physical type. He refused to do so unless the patient spent several days in bed before the study. This was agreed upon and then so far as the writer was concerned Providence played a hand by sending him a tonsillitis which kept him from the hospital for several days. During this interval one of the other members of the staff carried out the cystoscopy. The patient was dead the next morning.

Some years after this experience the writer saw a patient sitting in the dispensary awaiting cystoscopy. He strongly urged against the procedure and the cystoscopy was not done. Two weeks later his family physician thought he would see if the patient had any residual urine. He passed a metal catheter but found no residual. The patient was dead in the morning.

It therefore is obvious that this procedure is a deadly one in a few patients. Unfortunately there were no careful pre-cystoscopic medical

studies of the above cited cases, so that one cannot say that patients in whom this or that is found die if they are cystoscoped. He is thrown back upon that sixth or seventh sense which one seems to get from years of association with sick people which often bears the name "hunch." These three patients, however, were all of a type. They had what we urologists call a nephritic countenance, pale almost to the point of cachexia, some puffiness of the lower eyelids, and a slightly drooping lower lip. They were over sixty years of age, but seemed to be much older, slow of motion and had a slight dyspnea even when sitting quietly. Also, they seemed somewhat dulled mentally in that they answered questions as though they were going back into the mental pigeon-holes of a decidedly dim past.

It is realized that this is a decidedly poor medical description of a small but highly important group of individuals. They are not the victims of chronic urinary retention, but they do resemble very much those cases of chronic retention that the experienced urologist knows are only candidates for gradual decompression—patients who probably would die if the bladder were emptied suddenly.

In regard to cystoscopy in patients with normal urine who, for one reason or another, do not empty their bladders, one should bear in mind the great danger of urine infection even after the most careful aseptic precautions. While they may offer no definite contraindication to the performance of cystoscopy, they should present definite reasons for the procedure, or it should not be done. And it always is well to leave an ounce or two of some efficient bactericide in the bladder after it is carried out. It is not possible to remove all of the bacteria that are practically normal to the urethra; some of them are sure to be introduced into the bladder, and these patients rarely have developed any amount of resistance to their toxins. In such cases, it is wise to inform the patient of the great need for the study and that, occasionally, there are several days of bladder discomfort thereafter, even if the most careful precautions have been carried out. To do so makes the patient more complacent and less critical of the cystoscopist if he does develop a postcystoscopic cystitis.

It is the writer's opinion, based upon a number of unpleasant experiences, that cystoscopy should not be carried out on patients with active pulmonary tuberculosis unless it is urgently needed. These patients commonly are greatly harmed by cystoscopy. A description of their experiences will be found in the section entitled "Reactions after Cystoscopy." Patients with extensive active pulmonary tuberculosis, if they do not die, often take many weeks to regain what they lose by the experience.

There are those who would tell us that prostatic hypertrophy itself is a contraindication to cystoscopy. Their convictions usually are based on the fact that they have seen patients greatly harmed, or even killed, by the procedure. It is perfectly true that in the earlier days of cystoscopy many patients were studied thus who should not have been cystoscoped at the particular time that it was done. It should be realized that the patient with chronic retention is often as poor a cystoscopic risk as he is a surgical risk. Like all instrumental procedures, there may be a right time or a wrong time. Such are the things that give value to clinical observation, experience and judgment. To blunder thoughtlessly into cystoscopy in disregard of all warning signposts is to cast discredit on the art. The profoundly



toxic patient should not be cystoscoped as a rule until something has been done about his toxemia and many prostatic cases are thus afflicted

One should have some hesitancy about doing a cystoscopy upon the hematuric patient who presents a large soft hypertrophied prostate per rectum unless he is prepared to care for the added bleeding he may cause even to the point of a cystotomy. Such bleeding often is caused by large mucosal varicosities, and cystoscopy may precipitate conditions that otherwise would not attend. It is true that such bleeding often can be stopped by fulguration and one does best to have things ready for such an effort if he does cystoscope such patients while they are bleeding. Often it is better judgment to wait until the bleeding has stopped or to put the bladder at rest by the use of an indwelling catheter before cystoscopy is done.

With these exceptions and near exceptions it is probable that cystoscopy carried out carefully and gently is rather a safe procedure for about all of the rest of mankind if there is any real reason for its doing.

**Reactions after Cystoscopy**—To a considerable extent the reactions experienced by the patient following the performance of a cystoscopy depend upon the skill and technic of the cystoscopist. A large proportion of those that occur rather commonly are brought about by the condition for which the study is made and to a large extent, these can be predicted. Some few are the result of systemic factors which may or may not have to do with the cause for cystoscopy and these also can be foretold with some accuracy.

Considering then the most usual patients upon whom cystoscopies are performed as being those in whom there is no acute cystitis and no apparent reason why one should expect postcystoscopic reactions which of course also means that the patient entirely empties his bladder when he urinates what should one expect?

In such patients there should be no more than a feeling of vesical and urethral discomfort for the succeeding half hour or so. Usually there is during this time a desire to urinate which gradually wears off. After an hour the patient generally has to concentrate mentally on his urinary tract to be aware of any unusual sensation whatever.

If the cystoscopy is greatly prolonged or has been traumatic in type either from heavy handedness on the cystoscopist's part or lack of cooperation on the patient's these symptoms will be magnified and prolonged. As a rule there will be some slight vesical outlet bleeding as evidenced by blood in the urine and particularly by a few drops of blood at the end of urination—terminal hematuria.

If the patient has any marked degree of trigonal and posterior urethral congestion at the time of cystoscopy his after discomfort will last perhaps for a day or so. There often will be frequency and decided trigonal discomfort. Most of these patients have some slight degree of discomfort and frequency before cystoscopy and it is but natural that any instrumental interference should step it up.

If there is any degree of cystitis at the time of cystoscopy there may be a marked increase in frequency and vesical discomfort or there may be very little. The controlling factors seem to rest in the type of cystitis present. In active cystitis the increase usually is pronounced whereas in the presence of inactive cystitis wherein there is just a duskiness of the

general bladder wall, instead of the bright red of active processes, there usually is little increase of discomfort. We, of course, are not including tuberculous cystitis in this group, for that belongs in a category all its own.

So far, there have been considered those patients whose reactions are almost never associated with any change of temperature. They all empty their bladders, for which reason they experience no infection due to cystoscopy, no matter how carelessly it may have been done as regards asepsis. This certainly does not justify one in forgetting his aseptic technic in any cystoscopy, for cystoscopy is an art of surprises and one does not know what he is going to find until he has found it. There are cases of cystitis which are made much worse by the introduction of other bacteria and no one knows which they are until it is too late.

Before going into a consideration of obstructing lesions at the vesical outlet associated with residual urine, it is well to consider that most interesting of all bladder diseases, tuberculosis. And we need not confine ourselves solely to those tuberculous patients who have bladder tuberculosis, for those with active or mildly active pulmonary tuberculosis may be of even more importance to the cystoscopist from the standpoint of post-cystoscopic reactions.

In the presence of active vesical tuberculosis, cystoscopy, as has been said elsewhere, is so painful a procedure that some type of efficient anesthesia is usually needed. As one is viewing such a bladder he is prone to get the idea that disturbing it with a cystoscope is almost a criminal act. He cannot see how the patient is to escape the most atrocious after-reaction and, yet, to his surprise, the patient may be so greatly relieved that he asks for another cystoscopy. From a reaction viewpoint, this is one of the most remarkable things of the art and it happens with surprising frequency. Occasionally, the symptoms are made slightly worse but seldom are thus for any great length of time. Of course, some of these patients are so miserable from vesical pain and frequency that one would have to add a lot to see the difference.

There is a rare tuberculous lesion of the bladder to which the foregoing does not apply. The writer has seen but three or four of them among thousands of cystoscopies in the last twenty-eight years. For want of a better name, these have been called "inoculation ulcers," though they are not due to continued contact with other ulcers, as should be the case with true inoculation ulcers. They are due to the fact that they occur on that portion of the bladder that overlies the ureteral orifices when the bladder is empty, and these bladders are so intolerant of fluids that they are almost always empty. Transversely across the apex of the bladder are one or several shallow ulcerations covered by a pale yellow film and surrounded by a narrow red areola. The rest of the bladder is perfectly normal in appearance (Fig. 385). The postcystoscopic reaction in these cases is almost explosive. Not only is there an immediate increase of symptoms that already were almost unbearable, but the inflammation spreads to the entire bladder wall. This becomes so red and edematous that the original lesions no longer can be mapped out. There also is likely to be some slight elevation of temperature, starting within twelve hours and lasting for several days—days, in which sleep is obtained only by the generous use of opiates.

The most singular cystoscopic reaction that the writer has seen has been

cited elsewhere but will stand repeating here. It occurs in the presence of active or even mildly active pulmonary tuberculosis with or without urogenital involvement. It is such an invariable reaction (one exception has been seen among at least fifty cases) that one can be almost sure that the patient has pulmonary tuberculosis if it occurs. With this exception practically all postcystoscopic febrile reactions start within twelve hours of the cystoscopy. In this one the patient feels fine for the first thirty six or forty eight hours and, then, has a sudden rise of temperature ranging from  $103^{\circ}$  to  $106^{\circ}$ , which commonly is preceded by a chill. In advanced pulmonary cases the febrile seizure continues for from two to six weeks and any gains the patient may have made in the preceding weeks are quickly lost. In exceedingly active cases, death may be greatly hastened.

The value of this observation is twofold. It demonstrates that (a) no case of pulmonary tuberculosis should be subjected to cystoscopy unless the emergency is so great as to be well worth the risk to the patient, and (b) when such a reaction does occur it is almost a safe proof that the patient has pulmonary tuberculosis. Upon a number of cases the writer has had such a diagnosis confirmed in patients not suspected previously of having any pulmonary involvement. And, if some sad experiences had not taught him to withhold cystoscopy in cases of pulmonary tuberculosis, he probably would have merited by this time the title of Lord High Executioner. He knows of no cystoscopic warning that more nearly warrants being "called from the house-tops."

As we turn to the reactions common to those patients with residual urine we find that they vary with the condition of the urine. The patient with the clear urine runs far more risk of having a marked attack of cystitis associated with fever, and perhaps much prostration, than does the one with purulent urine. The latter, usually, has developed a high degree of tolerance to the toxins of the bacteria present. Occasionally, he does experience an attack of so called urethral fever which begins with a chill and a high degree of temperature and usually subsides quickly. At times however, the febrile seizure may last several days, at others, there is a true pyelonephritis which may prove fatal. The former group is the group that the urologist dreads to touch. In such patients the utmost asepsis is needed for the prevention of infection of the residual urine and the cystitis and days of fever and prostration so common to initial infections. No matter how careful the technic, it is almost impossible to prevent the carrying of some of the patient's urethral bacteria back into his bladder, and it is for this reason that it is wise to leave some efficient bactericide in the bladder, as repeatedly has been advised.

Just how much reaction, if any, one should expect after cystoscopy in the presence of vesical outlet obstruction from prostatic hypertrophy in the patient whose urine already is infected depends mainly upon the physical condition of the patient. One, of course, may be unfortunate enough to cause bleeding from one or several of the dilated veins that are so common to greatly obstructing prostates. Or, if he tries to force his cystoscope into the bladder without due regard to the changed curve of the posterior urethra, he may produce vesical outlet trauma which may make for a variety of symptoms. Otherwise, it is not usual to cause any amount of postcystoscopic discomfort or change beyond that formerly present.

except in the occasional debilitated patient described under the heading of "Contraindications to Cystoscopy."

Certainly, the experiences of most cystoscopists who exercise due care in their technic and in the selection of cases, warrant no one in making the broad statement that patients with prostatic hypertrophy and residual urine should not be subjected to cystoscopy. As a rule, the data obtained well repay the patient for any risk he runs.

What has been said about cystoscopy in patients with prostatic hypertrophy applies equally well to those with prostatic carcinoma. It is not unusual that such patients must be cystoscoped but, if done, it rarely precipitates any alarming after-symptoms.

#### CYSTOSCOPIC PROCEDURES

**Preparation of the Patient.**—As a rule, no previous preparation of the patient is required for the performance of a cystoscopy unless roentgenograms are to be made.

The presence of quantities of pus in the urine formerly was considered to be a contraindication to cystoscopy unless the patient had been given methenamine for several days. This was a wise precaution but largely has been disregarded of late years.

In neither the male nor the female is there any call for shaving the parts prior to a cystoscopic study. It would seem superfluous to mention this were it not for the fact that one occasionally finds hospital patients who have been thus prepared for cystoscopy. Honest cystoscopy needs no such stagedressing.

The external genitalia should be cleansed carefully and the urethra, also, should be rendered as germ-free as possible. This latter may be done rather well by injecting and retaining for some time a mild antiseptic fluid, such as 1:3000 neutral acriflavine. If it is deemed wise to use a local anesthetic, it even may be dissolved in the acriflavine solution, as has been mentioned under "Anesthesia for Cystoscopy." This saves much time, as it does the two things at the same manipulation.

Cystoscopy in young children must be performed under a general anesthetic, for which reason they should be prepared for it in the usual way. Beyond the age of sixteen, youths of the more stolid types frequently do not need a general anesthetic unless particularly prolonged and painful procedures are to be carried out. But it is best to have them prepared for such anesthesia, as it is a simple matter to misjudge the supposed stoicism of youth.

The administration of methenamine, together with either acid sodium phosphate or ammonium chloride, in those patients with clear urine and in whom one suspects the presence of residual urine, is a good plan where feasible. Just how much real good it does is a question but, at least, the theory is good. All such cases do not offer an equal degree of deliberation, however, and the leaving of an antiseptic solution in the bladder, as described, largely overcomes the supposed need for previous medication.

The patient with a chronic retention to the extent that the bladder is always distended should have a period of gradual vesical decompression before cystoscopy is attempted. To take other chances with such patients is to add mortality to a procedure which, judiciously used, should have none.

In hospital cystoscopies it is common to employ preliminary injection of morphine or some codeine administered orally. In the highly nervous, this may be a wise procedure but, if an effort is made to remove the patient's apprehension and real gentleness of manipulation is used, it is little needed. In office cystoscopies such a thing is rarely done for obvious reasons. Seldom does one wish it had been carried out.

**Position of the Patient**—In the performance of cystoscopy on male patients it should be borne in mind that the membranous urethra, with its position fixed by the anterior and posterior layers of the triangular ligament, acts as a fulcrum for the cystoscope, as previously has been pointed out. In fact, it is the only firmly fixed portion of the lower urinary tract, and in the use of instruments with a straight shaft, the normal curves must be straightened out. Anything that interferes with the straightening out of these normal curves adds to the difficulty of the cystoscopy and the pain of the procedure. For this reason, one of the things of greatest importance is that the patient be placed in a position wherein relaxation of the perineum is possible.

The more sharply the thighs are flexed upon the abdomen, the greater is the tension placed upon the perineum. This, of course, does not change the position of our fulcrum but it does limit our ability to bring that portion of the anterior urethra lying between the penoscrotal angle and the bulbomembranous junction into proper alignment with the direction of the posterior urethra. Under such circumstances, the constant tendency of the intravesical portion of the cystoscope to press upon the most sensitive segment of the bladder, the trigone, must be overcome by a downward pressure of the manual end of the cystoscope, a pressure which blunts the tactile sense of the operator and greatly increases the discomfort of the procedure for the patient.

Thus, if one would minister most to the patient's comfort and in fact, to his own convenience, he must place his male patients in such a position as to relieve the perineum of the tension due to too great flexion of the thighs on the abdomen. With proper perineal relaxation, the cystoscope lies comfortably in the urethra on a line with the long axis of the torso in the absence of conditions pushing up the posterior vesical lip. It does not really have to be held by the operator unless the patient strains. Such a position can be obtained by an arrangement that allows of having the thighs flexed at an angle of about 45 degrees from the horizontal plane of the torso when the patient lies in the dorsal position shown in figure 273. In one's office this position is easily obtained by the use of the Bierhoff leg holders if their uprights are bent so as to place them well beyond the end of the table (Fig 273).

Often, cystoscopies must be carried out in hospitals not properly equipped for the procedure. It frequently occurs that the only leg holders available are the straight rods with the woven loops. If the feet are placed in these loops, as nurses generally see that they are, the patient is in a lithotomy position that makes cystoscopy decidedly difficult. If, on the other hand, pads are placed under the bend of the knees to prevent cutting of the loops placed in this region, the patient is pushed back from the end of the table and a pad or sandbag placed under the buttocks the proper amount of perineal relaxation usually can be obtained (Figs 274 and 275).

If not, the feet can be placed upon stools, which always seem available in operating rooms.

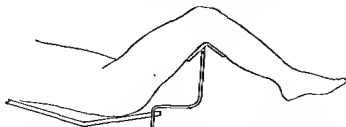


Fig. 273.—Excellent position for cystoscopic study. There is good general relaxation and no tension is thrown on the perineum.

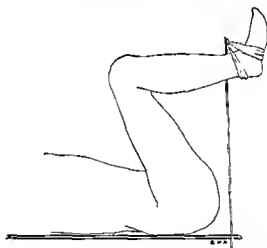


Fig. 274.—Drawing to show disadvantageous cystoscopic position of the male by the use of straight leg holders with loops. In this position the perineum is so stretched as to make painless cystoscopy almost an impossibility.

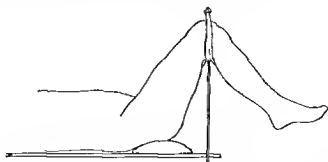


Fig. 275.—Outline of method whereby excessive tension on the perineum may be overcome where it is necessary to use the straight leg holders commonly found on operating tables.

Where conditions are not ideal for the obtaining of a proper position for cystoscopy, one can make use of the procedure that Kretschmer always uses. As previously has been said, the cystoscopist places his patient on a

flat table with the buttocks sharply raised and the thighs separated and rotated outward. At first glance, this would seem to be an extremely awkward method, but, in reality, it is comfortable for the patient and not so inconvenient for the operator. It is invaluable where patients cannot be moved from their beds. It also is useful where deformity makes it impossible for the patient to be placed in the position generally used for cystoscopy.

In the presence of marked lumbar lordosis, one frequently must exercise some ingenuity to maneuver the patient into a position suitable for cystoscopy. Macalpine has suggested the plan depicted in figure 276 for these, and for that rather large number of individuals who, because of pain, or the fear of it, arch the lumbar spine forward. Most cystoscopic tables, however, are not arranged for this position. With most of the American tables that portion upon which the buttocks rest extends far on to the dorsal region and does not break at the desired point.

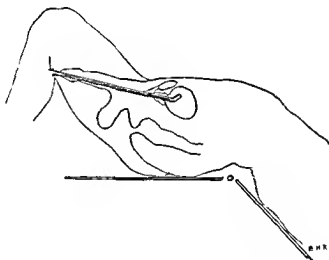


Fig. 276 Cystoscopic position suggested by Macalpine to overcome effect of marked lordosis

In the presence of lordosis the tendency of the pelvis to tilt downward can be overcome by making the table perfectly flat and placing pillows under the buttocks so that the pelvis is raised well above the plane of the table.

Where the patient arches his lumbar spine because of pain or apprehension, it is only necessary to stop the cystoscopy long enough to remove the apprehension and gain his cooperation or, by the exercise of much more gentleness, obliterate the pain. If this latter cannot be accomplished an effective anesthetic should be used.

For the application of chemicals to limited areas of the bladder wall, Luys has suggested the knee chest position as is used in the female for the Kelly cystoscope. In this way the bladder can be made to fill with air as it does in the female. One, however, only has to visualize the cystoscopic difficulties of such a position in the male to decide that he would rather resort to real air dilatation for such a purpose. In some thin pa

tients, placed in an exaggerated Trendelenburg position, the pull of the abdominal viscera is sufficient to make air dilatation possible.

Of almost as much importance as patient position, is that of the operator. While most operators prefer to sit down during the performance of a cystoscopy, it is a fact the standing position gives much more freedom of action and necessitates the assumption of fewer cramped postures. As previously has been pointed out, it is a simple matter to have the table legs lengthened or to place the table on a platform so that the operator can stand at his work.

With the female, one need not give so much attention to the obtaining of positions that favor relaxation of the perineal muscles. In her, there are no urethral curves to be overcome, nor is there a fixed fulcrum upon which the cystoscope will rest without being held constantly by the cystoscopist. If he releases his hold on the instrument it falls out of the bladder.

**Anesthesia in Cystoscopy.**—The need for the general use of some form of anesthesia for the performance of cystoscopy rests with the operator. It depends largely upon his gentleness of manipulation and his ability to banish the patient's apprehensive mental state. That the latter is a great factor in increasing discomfort into pain is shown by the fact that, if the first cystoscopy was gently done, later cystoscopies are far more kindly borne. Or, if the patient had some type of local mucosal anesthetic the first time, the injection of water, salt solution or any nonirritating fluid into the urethra usually will make the second cystoscopy even more comfortable than the one in which a real anesthetic was used. Certainly, if cystoscopy were an extremely painful procedure, one should not be able to remove that pain, or even reduce it, by a preliminary injection of sterile water and what might be called "vocal anesthesia" aimed at reducing the patient's apprehensive state. This, the writer has been able to do upon many patients who had been given elsewhere a real local anesthetic for a previous cystoscopy. And almost invariably he has been told how much less the second one hurt. In fact, there is much reason to believe that in most cases the "vocal anesthesia" followed by great gentleness are commonly as efficacious as real local anesthesia.

There are, of course, operators who always should use some form of anesthetic, and there are patients upon whom any cystoscopist should use some form of anesthesia. Particularly is this latter so of children, patients with known vesical tuberculosis and, perhaps, of those in whom fulguration is to be done at or near the vesical outlet.

For local anesthesia to the urethra and bladder one must first be sure the bladder is empty. He then can inject, by means of the rubber-bulb syringe, an ounce of his chosen solution, holding some of it in the urethra by compressing it at or near the meatus. While this may be held in by the fingers, a more convenient way is by the use of one of the many penis clamps, of which that devised by Hyams (Fig. 27) is the simplest and most comfortable for the patient.

The solutions most commonly used for this purpose are 2 to 4 per cent procaine, 1:5000 nupercaine, and others of like nature. Most of them should be allowed to remain at least ten minutes before cystoscopy is started.

Caudal anesthesia, the technic of which is described elsewhere, is far



more efficient but it fails in about 10 per cent of the cases. If it is used, one should bear in mind that it relaxes the sphincters and easily could lead to the making of a diagnosis of cord bladder, because the vesical outlet was relaxed.

Sacral nerve block, a much more difficult procedure, gives a perfect anesthesia when properly done.

Some cystoscopists are enthusiastic about the utility of the intravenously used anesthetic, evipal. This produces a rapid general anesthesia lasting about twenty minutes. It may, however, be prolonged by the careful injection of more of the solution. Fatalities have been reported.

For prolonged surgical procedures in patients with marked tuberculous involvements of the bladder and in children, the usual forms of general anesthesia best fitted to the particular patient should be resorted to.

Some few cystoscopists depend entirely upon the use of cocaine, in 5 to 10 per cent solution, to the urethral mucous membrane. In view of the untoward reactions, even deaths, that have been reported, it should be used cautiously or, probably, not at all. Certainly it should not be injected into the urethra to relieve the pain of a recent trauma. Many of the fatalities reported have been due to this error.

**The Passage of the Cystoscope**—Before starting to pass the cystoscope into the bladder one should make it an inviolable rule to assure himself that the illumination works and is properly adjusted. If he fails to do this routinely he will find that he occasionally has to withdraw the instrument because he has no light. With that usual perversity of animate and inanimate things, this seems far more likely to occur when one is studying a particularly nervous patient or one through whose urethra he has had difficulty in passing the instrument.

It is an excellent plan to have the patient empty his bladder immediately before the cystoscope is introduced into it. In this way one is rarely in doubt as to whether the patient has any residual urine or not. In order to make such findings of real value, it is best for the physician to absent himself from the room while the patient is voiding and to banish any idea of hurry that the patient may have. There is a good percentage of patients who do not empty their bladders entirely in the presence of others or if they are hurried, as has been said elsewhere.

Owing to the difference in shape of the cystoscope from that of the usual urethral sound with the Thompson curve, it must be passed in a different way. In introducing it one does well to have in mind several things that are of extreme importance from the patient's end of the instrument. In the first place, an instrument passed into the canal slowly causes far less pain than does one passed quickly. Also, sphincter muscles resent being quickly forced, particularly from the direction opposite to that on which Nature placed the stimuli to relax. Further, instruments passed quickly through sphincters are grasped by them, giving the impression of real narrowing where things actually are as they should be.

There are certain parts of the urethra that are far more sensitive than others, parts that he who wishes to cause no pain touches but lightly or not at all. These areas have been alluded to in an earlier section but will bear repetition here. The floor of the anterior urethra is more sensitive than the roof, and the area of the bulbar urethral floor just distal to the

cut-off muscle is even more so. Again, the floor of the posterior urethra has greater pain sense than has the roof, and the verumontanum often is far more sensitive than the rest. The posterior vesical lip is richer in pain sense than are the lateral and anterior margins.

Viewing this in its entirety we readily can see that the more one follows the roof of both portions of the canal with the tip of his instrument the less likely is he to produce more than slight discomfort. If, added to this, he prevents the cystoscope from resting on that most sensitive of all these surfaces, the trigone, he will have less bladder spasm and the patient will think more kindly of him.

Thus, to pass the cystoscope the penis should be held at a stretch to obliterate the cross-bands on its floor, and at a right angle to the long axis of the body. With the tip of the cystoscope (or the concavity of it)

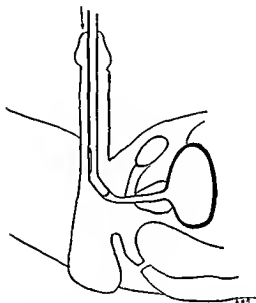


Fig. 277.—Introduction of the convex cystoscope into the bladder. The instrument is passed almost perpendicularly through the anterior urethra until its tip reaches the bulbar portion of the canal.

toward the patient's trunk, the meatus is slowly and carefully entered and the beak is allowed to drift by its own weight until it comes to rest in the bulbar portion of the urethra. During this manipulation the operator holds the instrument as lightly as he can to keep it from falling and, by his tactile sense, judges of the density of the urethral surface as the cystoscope makes its journey to this point. To hold the instrument firmly is to blot out one's tactile sense, rob him of the knowledge gained by it, and make the procedure much more painful for the patient. (Fig. 277.)

So far we have gotten the tip of the instrument to the bulbomembranous junction, and the point at which it has come to rest is at least a quarter of an inch lower than the entrance into the membranous urethra. (Fig. 278.) In order to enter the sphincter one, without trying to make the instrument advance, but gently holding it so that it will come out no

further should depress his end of the instrument until it is almost on a line with the long axis of the patient's body (Fig 279) By exerting the slightest pressure the instrument in a moment or so will be felt to make a slight advance

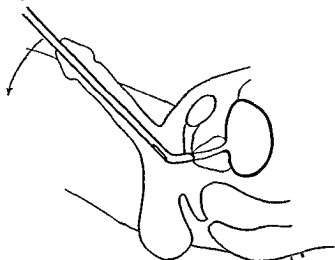


Fig 278—The tip of the cystoscope having reached the bulbomembranous junction the manual end is carried downward while very gentle pressure is made so that the beak will enter the membranous urethra

As the beak passes through the cut off muscle the outer end of the instrument should be depressed further so as to keep the tip against the roof of the posterior urethra as the operator gently pushes it on into the bladder (Fig 280)

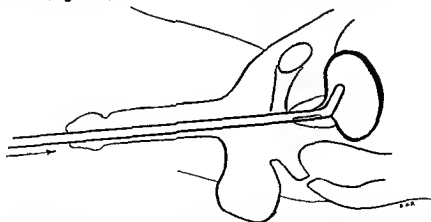


Fig 279—The beak of the instrument having entered the posterior urethra the shaft is carried further downward until it lies in the long axis of the body when in the absence of elevation of the median lobe of the prostate it can be passed straight into the bladder

Should the instrument meet with any obstruction at any point in the canal it should not be pushed beyond there before the operator assures himself that no damage will be done One occasionally encounters a urethral stricture where he least expects to find it

Except in the presence of prostatic carcinoma, prostatic tuberculosis, hard fibrous stricture, and the occasional case of median-bar formation, the sensation imparted to the fingers is that of soft resilient tissue. Any departure from this is readily noted if the instrument is not grasped too firmly.

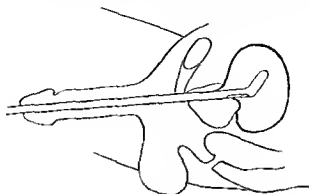


Fig. 280.—Cystoscope at the end of its introduction.

When the end of the instrument is in the bladder it should lie in a line with the long axis of the body, unless the thighs are too sharply flexed on the abdomen. The lack of perineal relaxation brought about by faulty position of the patient not only makes the cystoscopist bear down too firmly in introducing the scope, but, when it is in, pushes the manual end of the instrument upward and the beak downward, into the trigone, much to the patient's discomfort.

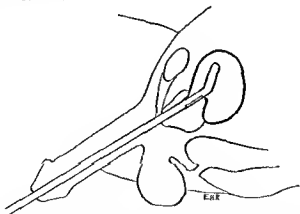


Fig. 281.—Drawing to illustrate how greatly the manual end of the cystoscope often must be depressed to make its beak pass over a median lobe obstruction.

If the vesical outlet is raised for any one of a number of reasons the manual end of the instrument is far lower than in normal cases. Usually, under such circumstances, the inner end of the sheath points toward somewhere between the suprapubic region and the navel.

The passage of the straight cystoscope into the bladder differs only in the extent to which it must be pushed downward so that its tip is in line with the external sphincter. It is the same as that described for the endo-

scope One should combat the tendency to push the instrument onward before it is in the proper direction Roughness at this point may rupture the urethral wall If the patient's position places the perineum at too great a tension the straight instrument is a very difficult one to pass

There is no need for a description of the passage of the cystoscope into the female bladder, for her short urethra has no curves to be overcome Elderly women often have a very thin vesical rim on which it is easy to catch the beak but, as a rule, a slight change in the direction of the instrument overcomes the obstruction without harm to the patient.

**The Study of the Bladder**—In making a study of the urinary bladder the cystoscopist does well to establish a routine method of procedure For it is possible by the slightest trauma to the mucous membrane quickly to produce highly misleading bladder pictures A little scraping of the tip of the instrument on the bladder wall, the sucking of tissue into the instrument as the obturator is removed or, even, the too rapid emptying of the bladder, may produce mucosal changes highly suggestive of disease processes The writer learned this on his first cystoscopy He carefully described in his report a large assortment of red blotches and a decided trabeculation The report was read by one who had done much cystoscopy, who remarked that no bladder could contain so much and give the patient so little difficulty Two days later all of the described 'pathology' was entirely gone and the bladder was perfectly normal

As the result of this experience a routine method of procedure was mapped out which has avoided like results There are about six things that are likely to produce mucosal changes that can simulate bladder pathology They are as follows

- 1 Scraping the bladder wall with the extremity of the cystoscope (Fig 282)
- 2 Sucking mucous membrane into the fenestration as the obturator is withdrawn (Fig 283)
- 3 Pressing the instrument into the trigone
- 4 Too rapid emptying of a distended or, even, a partially distended bladder
  - 5 Too rapid and too complete filling of the bladder
  - 6 Too prolonged cystoscopy no matter how gently and carefully done (Fig 284)

One with some justice, might add a seventh to this list by including patient apprehension, for vesical intolerance often comes on much more quickly in the apprehensive than it does in the placid patient Thus intolerance first shows itself in the production of a fine trabeculation that easily could raise a suspicion of cord bladder

Most of these pseudopathologic lesions are easily avoided if one pursues the following method of procedure

The patient should be told to empty his bladder immediately before cystoscopy If an anesthetic solution has been injected into the bladder its amount should be measured so that it can be deducted from the amount of residual urine, if any, that flows from the cystoscope after its introduction

In the passage of the cystoscope it should be remembered that, in the collapsed condition, a transverse fold of the bladder vertex lies over the vesical outlet Because of this, the beak should be passed slowly through

the vesical sphincter and should be turned just as slowly and gently so that the fenestration of the cystoscope faces the lateral aspect of the bladder. In this position neither the trigonal mucosa nor that of the vertex is drawn in as the obturator is removed. (Fig. 283.) Also, the instrument should

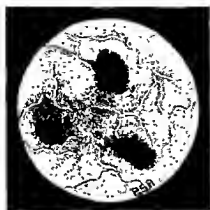


Fig. 282.—Reddened blotches on the posterior bladder wall due to trauma from the beak of the cystoscope.

be held in such a position that it does not rest on the trigone. In this way one avoids the red mucosal blotches so commonly seen when less careful methods are used. (Fig. 282.)

If, before the obturator is much more than started on its way, the operator opens one of the stopcocks on the sheath, any residual urine can be



Fig. 283.—Parallel marks on the trigone caused by pulling the mucous membrane into the cystoscope fenestration as the obturator is withdrawn.

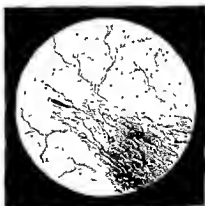


Fig. 284.—Appearance of the trigone at the end of a prolonged cystoscopy—commonly mistaken for true trigonitis.

withdrawn slowly, and, thus, avoid changes due to rapidly emptying the bladder where much fluid is present.

With our present cystoscopes, too rapid filling of the bladder rarely takes place, but overdistention is common. In most cases, this can be avoided by watching the patient's reaction. If he does not say that his

bladder is too full his actions speak almost as loudly. He either begins to squirm around on the table or to show other evidences of acute vesical discomfort.

Too prolonged cystoscopy with its almost invariable mucosal changes, usually is corrected as the cystoscopist becomes more and more experienced in the interpretation of bladder pictures. Often it is better to do cystoscopy twice on a patient than to overdo it once. (Fig 284.)

No matter how gently or how quickly cystoscopy is carried out the bladder seldom fails to undergo some mucosal changes as the result of it. This is particularly true of the trigone and the posterior urethra and it frequently is so of the musculature of the bladder on its posterolateral aspects which frequently are thrown into fine trabeculations at the end of study. If the study is prolonged and particularly if the viscus has been distended greatly the trabeculation may involve the posterior bladder wall as well and usually it is of a much coarser variety.

Thus having carefully inserted the beak of the instrument through the bladder sphincter advanced it so that the fenestration is well within the bladder, turned it laterally so that no mucosa can be drawn in as the obturator is removed and the viscus emptied as described the periscope is introduced and the study begun. The dilating fluid is turned on and the trigone, ureteral orifices, vesical outlet and posterior urethra are studied before they can undergo much if any, change. The instrument then is pushed back into the bladder and the entire wall is studied at more leisure. The wall is watched as it distends and later, as it collapses upon the evacuation of the fluid in order to discover any extravescical anchoring that could interfere with its proper mobility.

When the bladder has been studied carefully the dilating fluid is evacuated until the bladder is only partially filled and the fenestration again is drawn into the posterior urethra without the dilating fluid flowing through the instrument to dilate it to see if there is relaxation of the vesical outlet and whether or not it is possible to visualize the posterior urethra. Normally as has been said elsewhere it is not possible to visualize the posterior urethra unless the dilating fluid is flowing. In spinal cord diseases associated with vesical outlet relaxation this canal is sufficiently dilated by fluid passing into it alongside the cystoscope from even a partially distended bladder to make visualization possible. If spinal or sacral anesthesia has been used there frequently is vesical outlet relaxation as the result of the anesthesia and one should exercise great care about making a diagnosis of tubes or other spinal cord disease no matter how typical the cystoscopic findings.

If there is the slightest suggestion of median bar the patient is instructed to breathe through his mouth to avoid muscle tension. It is easily possible as is noted elsewhere for a patient to produce a typical picture of median bar by straining and to have it disappear completely when he relaxes.

In order to familiarize oneself with the changes that his cystoscopy makes in the bladder and posterior urethra it is a good plan for the beginner to pause long enough before terminating his study to compare the pictures with those seen at the beginning of his study. In this way he soon finds it possible to discount the importance of much that he sees toward the end of his study. Where one is allowing others to look into

the bladder, he does well to complete his visual study of the structures before relinquishing the cystoscope to them. There are many who never acquire a degree of skill and gentleness that make it possible for them to handle a cystoscope without trauma. To follow them, is to find an assortment of misleading bladder pictures.

**The Normal Bladder.**—The cystoscopic appearance of the normal bladder varies with the amount of illumination, the degree of dilatation, and the speed with which the viscus has been dilated. The slowly dilated bladder, under good illumination, shows a smooth mucous membrane with no evidence of muscular bands and no reddened areas. The circulation of the mucous membrane of the general bladder wall is plainly visible and the vessels run in no definite direction, but are arranged in a seeming network. (Fig. 285.) The surface is pink but, on full dilatation, the pink color quickly fades to a much lighter shade.

In contradistinction to the color of the general vesical wall, the trigone is of a much darker shade and, if the blood vessels can be seen, they are



Fig. 285.—Scheme for locating the ureteral orifices. *A*, Bas fond. *B*, Interureteric line. *C*, Trigone. The cystoscope is pushed backward so that the midline of the bas fond with its characteristic blood vessel arrangement is in view. The instrument then is pulled outward until the interureteric line is located. The cystoscope is pushed backward from  $\frac{1}{4}$  to  $\frac{1}{2}$  inch and given a  $\frac{1}{8}$  turn on its long axis.

observed to run fan-wise from the posterior vesical lip. (Fig. 285.) This arrangement of vessels is a very important consideration to the patient for it greatly favors congestion of the trigone in all pathologic lesions of the prostate or the mucous membrane at the vesical outlet.

At the posterior junction of the trigone with the general bladder wall there frequently is a transverse ridge, the interureteric ridge or plica interureterica. Often no ridge is apparent. It usually is possible, however, to determine this point of junction by the definite change in color of the trigone from that of the general bladder wall and the difference in circulation. Frequently, there is a transverse pale line at this point.

If the bladder has been filled too quickly there frequently can be seen, particularly on its posterolateral aspects, a mild grade of prominence of the muscle bands of its wall. As this type of trabeculation is of importance in the diagnosis of early tabetic involvement of the bladder, one should



avoid confusion in this regard by allowing the bladder to fill slowly and should avoid overdistention for the same reason.

If the bladder has been rendered intolerant by rapid overfilling or by undue trauma, its entire musculature goes into spasm, puckering the mucous membrane into countless folds and irregularities (Fig 286). Occasionally, in extremely nervous patients, similar bladder spasm occurs without such precipitating factors. This type of bladder contraction is in marked contrast to that seen when the dilating fluid is allowed to escape through the cystoscope. Under this condition it will be seen that the posterosuperior wall falls downward in a transverse fold as though it were being pressed by the fingers on the outside of the bladder. This fold sinks until it lies on the beak of the cystoscope and, of course, the vesical outlet when the cystoscope is not in the bladder. In very large bladders, particularly in the female, the lateral walls likewise push in to some extent as the viscus empties.

If, with the bladder about three-quarters filled, the cystoscopist watches the posterosuperior portion he not only can see the throbbing synchronous

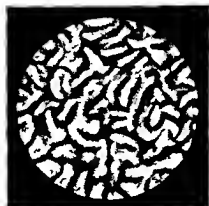


Fig 286 Countless rugae of the bladder mucosa seen when the viscus becomes spasmotic during cystoscopy

with cardiac systole but, as a rule, he can get a good view of the effect of intestinal peristalsis.

To the cystoscopic eye the general bladder wall, except on its posterior aspect, should present a continuous concavity, and any change in this is worth investigation. The posterior wall usually presents a central convexity caused by the rectum in the male and the uterine cervix and, possibly, the rectum in the female (Fig 320). The greater the amount of fecal matter in the bowel, the greater is this convexity.

The bladder of the female who has borne children, as is noted elsewhere, seems slightly shallower from front to back, but there is no question about its greater width. Often this widening is such as to make marked depressions in the bladder base to the outer sides of the ureteral ridges. During pregnancy both conditions are very marked.

Age, in the absence of pathology, does not greatly change the bladder in the male, but in the aged female there usually are very definite changes. In her, the general bladder wall gives one the impression that it is very thin,

the mucous membrane becomes almost a pearly gray and at times it assumes a mosaic appearance. (Fig. 287.) Varicosities are common and frequently there are the pinkish or brownish lentiform excrescences on its base which somewhat resemble the lesions of true cystitis cystica. (Fig. 288.)



Fig. 287.



Fig. 288.

Fig. 287.—Mosaic appearance of the bladder wall occasionally seen in the aged female.

Fig. 288.—Cystitis senilis feminarum.

While we usually think of the trigone as a real triangle it is not always so. At times it is Y-shaped and the ureteral orifices may differ greatly in location.

The wise beginner does well to start with normal bladders and see as many as he can of them. He should become familiar with the changes



Fig. 289.—Outline to demonstrate the usual manner in which the vesical wall collapses as the fluid is withdrawn at cystoscopy.

possible to them from his study and carefully should study them under all degrees of dilatation and illumination.

**The Vesical Outlet in Health and Disease.**—The normal vesical outlet differs greatly in the male and female owing to the presence of the surrounding prostate in the former. The mucous membrane within the

sphincteric grasp of the vesical outlet of the female may be thrown into radial folds, a thing rarely seen in either health or disease in the male. The female vesical outlet, aside from the indentations occasioned by these radial folds, is practically circular in outline and its outline rarely is changed by



Fig 290

Fig 290 Radial appearance of the vesical outlet common in the female and occasionally seen in the male, with fibrosis of the surrounding prostatic tissue



Fig 291

Fig 291—Mucosal tabs of the anterior rim of the vesical outlet—not uncommon in the female and of no pathologic significance

disease. On the other hand, the male vesical outlet undergoes no end of alterations in shape as the result of countless influences.

The normal male vesical outlet, viewed from without inward usually presents, except at its lower or posterior aspect, a rather uniform circle



Fig 292—Mucosal tabs commonly seen at the vesical outlet in some patients on whom the Koffmann dilator has been used

when dilated. At the posterior vesical lip this circle is broken by either a flattening or a convexity depending upon the transverse contour of the underlying median prostatic commissure with its superimposed 'trigonal uvula.'

Watched from the urethral aspect during its closure and opening, the

following changes are seen to take place. When the sphincter is closed the membrane is radially puckered, much as is that of the closed anal sphincter. At the moment of opening the posterior lip is seen to pull sharply downward and the lateral and superior corrugations gradually smooth out into a uniformly circular outline.

This normal outline of the vesical outlet may be encroached upon by changes in shape of the surrounding prostatic substance or by changes in the thickness of its mucous membrane. It may be greatly reduced in size by circular fibrosis and it may be greatly increased in size by the relaxation resulting from interferences with its normal enervation.

Except with changes due to disease of the mucous membrane itself, the interpretation of these alterations in vesical outlet contour in the male have to do with changes in the shape of the surrounding prostate gland. And it is by a proper interpretation of these departures from the normal outline that we are able to make our cystoscopic diagnosis of much of the pathology of the prostate gland and to outline the treatment appropriate to a given case.



Fig. 293.—The anterior cleft of bilateral prostatic hypertrophy. As a rule the lobes present a rounded surface instead of the slightly indented ones in this case.

In making such interpretations, one must be able to differentiate between the changes due to the mucous membrane itself and those resulting from changes in shape of the prostatic substance. This is not always such a simple matter as it would seem to be and errors in diagnosis are quite common. Further, temporary changes in the shape of the vesical outlet may occur as the result of acute and transient changes in the shape of the prostate gland—alterations that easily can be interpreted to be due to prostatic hypertrophy. And it is not always safe to assume that those pictures so commonly characteristic of hypertrophy are invariably occasioned by it. Acute, subacute, and even chronic infections of the gland can, and rather commonly do, cause changes at the vesical outlet that easily can mislead. For this reason, one should be careful to obtain all of the corroborative evidence possible before making a diagnosis of hypertrophy in the presence of a prostate of normal size, *per rectum*.

Apparently, some individuals have a more dense prostatic capsule than others and, in them, everything that causes a change in the size of the

gland reflects itself in a change from the normal contour of the vesical outlet or posterior urethra. If this swelling be mostly of the lateral lobes there may occur a pushing in of the lateral aspects of the vesical outlet to the extent of forming the so called anterior cleft so highly thought of in the cystoscopic diagnosis of lateral lobe hypertrophy. Added to this



Fig 294



Fig 295

Fig 294—Bilateral prostatic hypertrophy with normal commissure

Fig 295—Trilobar prostatic hypertrophy showing junction of the lateral and median lobe with trabeculation of the bladder



Fig 296



Fig 297

Fig 296—Cyst of the anterior rim of the vesical outlet causing the symptoms of prostatism

Fig 297—Bilateral prostatic hypertrophy with a cyst of the anterior cleft causing much obstruction. The patient urinated freely and had no residual urine after the cyst was destroyed by fulguration.

may be such marked lateral encroachment in the posterior urethra as to make the diagnosis almost certain and yet it is in error.

Again fibrosis of the prostate may reduce the size of the vesical outlet and mucosal edema may give it the outline of hypertrophy and obscure the typical picture of the existing median bar. The same contraction may push the lateral prostatic lobes into the urethra to further obscure the true condition and lead one into an erroneous diagnosis much to the chagrin of

the surgeon. Comparatively few cystoscopists have escaped this error; at least, the writer has not.

It is well also to remember that the enlargements of prostatic hypertrophy are almost invariably those that involve an entire lobe. In other words, they are large, smooth bodies in the absence of mucosal edema. Except with the recurrences following prostatectomy, they are practically never irregularly nodular masses, and one must view with a definite suspicion the smaller or irregular nodulations at times seen at the vesical outlet. They are usually malignant. Upon rare occasions they are tuberculous, and, even more rarely, they are due to other infections.

True hypertrophy of the anterior prostatic substance is extremely rare. Large retention cysts in this region occur with far greater frequency. (Fig. 296.) Such large cysts are seldom, if ever, seen on the lateral and posterior aspects of the vesical outlet. One should, then, view with considerable doubt a diagnosis of anterior lobe hypertrophy, particularly if the rest of the gland seems normal in size. Such anterior cysts usually give the impression of translucence but upon rare occasions they give the ap-

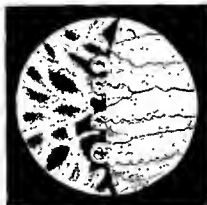


Fig. 298.—Small mucous cysts on the surface of a hypertrophied prostatic lobe.

pearance of solid tissue. In any event, it is best to fulgurate one deep cut into such a smooth anterior mass. If it is a cyst it immediately will collapse, providing the burn is deep enough to penetrate its capsule.

Regarding changes in contour confined to the posterior lobe, one should bear in mind that Home's glands lie just under the mucous membrane of the anterior trigonal angle, that these glands are susceptible to infection, and that, when markedly inflamed, their swelling may simulate median lobe hypertrophy.

Almost all of the vesical outlet changes of prostatic hypertrophy can be, and rather commonly are, simulated by prostatic carcinoma. Tuberculosis of the gland likewise may mislead. In both of these conditions one not only finds marked hardness and, perhaps, irregularity of the gland, per rectum, but he finds the cystoscope rather firmly grasped by the posterior urethra and gets the tactile sensation through the cystoscope of hard, resisting structures.

Smooth mucosal edema, at times, changes the contour of the vesical outlet but, under such circumstances, the membrane usually has a puffy,

watery appearance that should not mislead the trained eye. If due solely to interference with lymphatic return, there need be no great change in the color of the membrane. Changes due to mucosal inflammation or venous interference rarely mislead greatly.

Upon rare occasions one or both ureteral orifices may be almost at the vesical outlet and may make a marked change in the shape of the posterior lip. And upon equally rare occasions subvesical inflammatory masses may push up the trigone so as to give the appearance of median lobe hypertrophy.

It thus will be seen that the vesical outlet is not a region wherein first appearances based upon changes in contour, are always to be relied upon and that many confirmatory data are at times necessary if error would be avoided. Often a later study is advisable. Particularly is a second study of value in those cases of seeming early median bar formation. As has been stated elsewhere, it is possible for a patient, at the tension so frequently



Fig 299

Fig 299—Vesical outlet appearance of median bar. The first roll of tissue is the posterior vesical rim; the second is the hypertrophied interureteric ridge.



Fig 300

Fig 300—Anterior rim of the vesical outlet and bubble of air from the cystoscope sheath in the apex of the bladder.

occurring during a first cystoscopy to produce by muscle action those changes upon which a diagnosis of bar is made. Under complete patient relaxation the previous diagnosis cannot be substantiated.

The occurrence of the lymphocystic lesions elsewhere described is common at the vesical outlet, though they more often are confined to the posterior urethra. With proper care they should not be confused with other things.

In patients addicted to sexual pursuits favoring prolonged congestion there is often a broadening of the vesical rim on its lateral aspects with some slight pushing upward of the posterior vesical lip. This, at times partakes somewhat of the appearance of early trilobar hypertrophy. However, it is readily differentiated from this lesion by the absence of intra-urethral encroachment of the lateral lobes. Commonly, it is associated with a trigonal convexity from before backward, and a tortuosity of the trigonal vessels. (Fig 301.)

**The Posterior Urethra in Health and Disease.**—So closely associated in anatomy and function are the bladder, vesical outlet, and posterior urethra, that in many things they cannot be separated. However, there are several posterior urethral changes which merit separate consideration and others that blend so intimately with changes taking part in the other struc-



Fig. 301.—The venous injection and trigonal convexity resulting from *coitus prolongatus*. The curved line is the interureteric ridge.

tures that they must be considered with them. Some of these latter have been discussed under the heading of Minor Changes in Intravesical Contour and need not be repeated here.

Except for variations in the size and shape of the verumontanum in different individuals, normal posterior urethrae are all pretty much the



Fig. 302.

Fig. 302.—Small but visible prostatic openings and sulci beside the verumontanum.

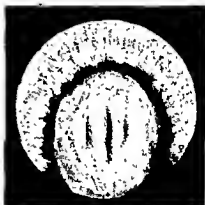


Fig. 303.

Fig. 303.—Endoscopic view of the normal verumontanum

same. Their differences in appearance to the cystoscopist are mostly due to illumination and to cystoscope pressure. Their observable blood vessels run mostly parallel to the long axis of the canal and can be made to appear enormously engorged with blood by the slightest pressure of the cystoscope in one direction or another. The openings of the prostatic follicles



on the anterior aspect of the median prostatic commissure (the declive) and in the lateral sulci practically cannot be seen. The apparent size and shape of the verumontanum differs with the type of cystoscope used, as well as the extent to which the patient contracts his sphincter muscles and with the caliber of the urethra. This structure undergoes great variations in size in the presence of both prostatic infection and congestion.

So greatly is the size of the verumontanum dependent upon the condition of the prostate gland as regards infection and congestion that considerable hesitancy should be had about attributing urethral symptoms to this structure alone. For it is only upon rare occasions that the size of the verumontanum is the only factor in their causation. Owing to its great increases in size it has become the custom to accredit it with almost every type of sensory and sexual aberration usually in utter disregard of other pathology to which its enlargement is secondary. It should be condemned because of its size only when all other possible factors have been eliminated.



Fig 304

The broad flat topped verumontanum commonly found in the confirmed masturbator.



Fig 305

Marked vesical outlet fibrosis with the openings of large prostatic pouches passing into the median commissure commonly associated with pain along the urethra.

for it has been subjected to much destructive treatment that it in no sense merited.

Late in life it is common to observe numerous small black concretions, symplexia superficially placed in the mucous membrane of the urethral floor. These are most numerous on the declive in the lateral sulci and anterior to the verumontanum. They are rare upon the lateral and superior walls. As they produce no symptoms or pathology they should be disregarded.

Plainly visible prostatic openings mean present or past prostatic infection. These openings vary in size from the minutest points to openings through which one often can see quite deeply into the gland. McCarthy has attributed the large scarred prostatic openings, especially if there is scarring of the urethral mucous membrane to played-out prostatic tuberculosis.

One at times sees large openings of channels seemingly passing in un-

der the median prostatic commissure. Such individuals commonly have a median prostatic bar as the result of the associated fibrosis and, occasionally, they are the victims of constant pain along the urethra. (Fig. 305.)

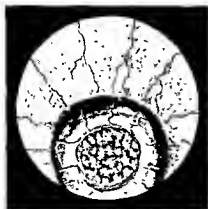


Fig. 306.

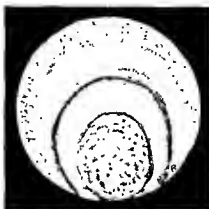


Fig. 307.

Fig. 306.—Granular mass protruding from the sinus pocularis.

Fig. 307.—Mass in the sinus pocularis back of which was a pocket of pus. Present in a sailor whose complaint was, "a bug in the rectum."

In individuals who have had a long-continued gonococcal infection, it is not uncommon to observe a granular mass filling the sinus pocularis and protruding from it. (Fig. 306.) At times this glandular mass occurs without the association of a previous gonorrhea. Such patients usually are the

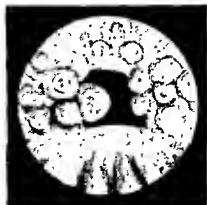


Fig. 308.



Fig. 309.

Fig. 308.—Lymphocystic bodies in the posterior urethra. Note the spindle-shaped lesions on the declive.

Fig. 309.—Pustule-like excrescences on the lateral walls of the posterior urethra occasionally seen in the presence of active, long-standing prostatic infection.

victims of urethral sensations of an annoying character as well as equally annoying rectal sensations, both of which disappear immediately upon the destruction of the mass.

Perhaps the most common mucous membrane lesions of the posterior

urethra are the lymphocystic bodies described under the heading of Tumors of the Urethra (Fig 308)

In the presence of long standing lateral lobe infections associated with repeated febrile attacks as in attacks of cystitis one occasionally finds roughness of the lateral urethral walls as though a number of pustules were protruding from them. Not uncommonly they are associated with much local discomfort and some distant evidences of focal infective absorption (Fig 309)

Fig 310



Fig 311



Fig 312

Fig 310—Edema bullosum of the vesical outlet in the presence of marked cystitis accompanying the residual urine of median lobe hypertrophy

Fig 311.—Scarring of the posterior urethra and large prostatic openings. Considered by McCarthy as due to played-out prostatic tuberculosis

Fig 312. Marked intra-urethral encroachment of the lateral lobes of the prostate

In contradistinction to the verumontanal swelling so commonly observed one occasionally encounters verumontana that are quite small and covered with a pale almost glistening mucous membrane. In association with such a verumontanum there usually is a pale glistening mucous membrane in the postmontane fossa, most marked laterally. Such a picture is not due to disease but to the fact that the area has been subjected to the action of strongly caustic applications usually silver nitrate. The glisten

ing quality of the mucous membrane is due to the fact that it has become squamous in type and has comparatively little surface-blood circulation. Such a patient frequently will have a large squamous epithelial area in the floor of the bulbar urethra; also, as the result of the spilling into it of a small quantity of the solution, which the physician has failed to mop out or neutralize as the endoscope is changed to a perpendicular direction in its withdrawal. At times, the mucosa will show a dusky, bluish cast from reduced silver.

A complete absence of anything resembling the verumontanum likewise is encountered. Usually this is the result of operation, fulguration or repeated applications of strong chemicals. Such patients seem no better nor worse than other patients with the same amounts of urethral and prostatic fibrosis but in whom the verumontanum has not been destroyed.

Raised bands of scar tissue, most commonly seen in the postmontane region, are the results of either chemical applications, prostatic abscess, or



Fig. 313.

Fig. 313.—Normal ureteral orifice at rest. (Pilcher.)



Fig. 314.

Fig. 314.—Normal ureteral orifice open for the ejection of urine. (Pilcher.)

old prostatic tuberculosis with healed urethral ulceration. True ulcerations of the urethral mucous membrane are seldom seen.

Changes in the contour of the posterior urethra characteristic of the different types of prostatic disease are described in their appropriate places.

**Locating the Ureteral Orifices.**—One of the most difficult things for the beginner in cystoscopy seems to be the finding of the ureteral orifices. On an average, he is not very expert at it until he has cystoscoped a number of cases and, even then, he has considerable difficulty in finding the less obvious orifices. Troubles in this regard more often are due to the usual methods of teaching than to a high degree of obtuseness on the part of the learner. One would think it extremely easy properly to orient things in the urinary bladder until he started to do so. The boastful, overconfident type of beginner soon draws in his horns and becomes convinced that at last he has found one thing about which he is not so smart. Years ago, when the writer was giving courses in cystoscopy, he used to encourage such individuals in their boasting so that the fall that followed the pride would make them more like others.

If one tries to locate ureteral orifices by visualizing the face of the clock and saying that at 4 30 and 7 30 he should find the orifices, he soon finds himself very much confused and it is quite a while before he has reason to be proud of his success. This is the most usual way of teaching and, probably, the least successful.

Unquestionably, the easiest and quickest way for the beginner is first to familiarize himself with the cystoscopic appearance of the general bladder wall and of the trigone so that he does not confuse the two, but immediately can differentiate between them. Having reached this point, he turns the lens so that the bladder base is in view at its midline. He then slowly draws the cystoscope outward until there is no doubt in his

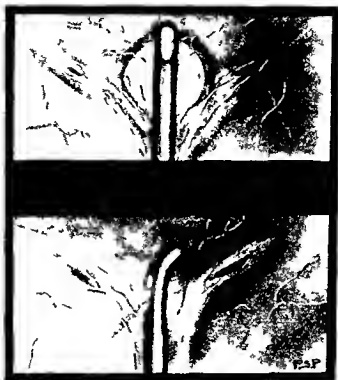


Fig. 31) Diagrammatic illustrations to show the author's method of locating the ureteral orifices as outlined in the text.

mind that he has in his field of vision the line of demarcation between the general bladder wall and the trigone. Sometimes this is a distinct transverse ridge, the plica interureterica, though more often it is just a flat surface where the colors change. In other words, he withdraws the instrument until the distal half of the field is bladder wall and the proximal half is trigone, or as he seems to see it, the upper and lower half. In doing this it is well to hold the inner lens at a fair distance from the bladder wall.

If, then, he pushes the cystoscope about  $\frac{1}{4}$  inch further in and makes about an eighth turn in either direction he should have the normally placed orifices in either field. If he does not see them he can push the instrument another  $\frac{1}{4}$  inch further in and gradually turn it so that his field of vision is carried toward the side. He then will have no difficulty in finding a

diagonal ridge, the ureteral ridge, by means of which, if he follows it up and down, he hardly can help locating the normal orifice. Should he still be in doubt, he should watch this ridge for its peristaltic wave which, if followed, should lead him to his goal.

At times, the orifice is extremely small or it may be placed on the outer side of the ridge. In either case, he can watch where the ureteral orifice should be for the swirl of urine as it enters the bladder.

Even the best of cystoscopists are sometimes unable to find a ureteral orifice, particularly where the bladder wall is edematous or is the seat of other pathology that obscures. In this event the intravenous injection of some indigocarmine usually will solve the problem. As a matter of fact, the beginner often does well to resort to indigocarmine if he finds that he is having real difficulty in locating these openings. Once an orifice is found it should be lost and relocated time after time until the learner almost automatically can find these elusive little slits.

It occasionally happens that the ureteral ridges are not really ridges but are level with the surrounding surfaces. Under such circumstances, and in the presence of an abnormally small orifice, it is well to locate the larger blood vessels at the lateral margins of the trigone and follow them to their points of decussation. These vessels, unlike those of the rest of the trigone, extend beyond that triangle, pass along the place where the ureteral ridge is, or should be, and divide just below the opening of the ureter. If such division is absent, there usually is a blood vessel passing internal to the orifice while another vessel of equal prominence passes external to the ureteral opening.

Where edema blots out these circulatory guides, there usually is no difficulty in mapping out the region of the ureteral ridge and, instead of spending much time searching for an opening that cannot be seen, one usually is correct if he assumes the orifice to be in the midline of such a swelling at the junction of the middle and lower third of the edematous ridge. If he has not given an intravenous injection of indigocarmine, he usually can find the orifice by very gently exploring this area with the catheter tip.

If the edema is the result of old tuberculosis, this rule does not apply so rigidly, for ureteral contraction may have pulled the orifice to a point lying near the upper end of the swelling—the junction of the middle and upper third or, even, in the upper third.

**The Bladder Changes During Pregnancy.**—During pregnancy there is a constant change in the normal diameters of the bladder. In the early stages there is but a slight internal convexity of the posterosuperior wall. This gradually increases until the bladder diameter becomes greatly shortened anteroposteriorly. This limitation is compensated for by a lateral bulging which, at times, becomes so marked as to constitute almost the entire urine-carrying space. During the last few weeks of pregnancy, when the uterus is descending further into the pelvis, the anterior and posterior bladder walls may be forced into actual contact.

Under such circumstances, should cystoscopy be required, it may be necessary to push the cystoscope sharply to the side in order to get it to enter the bladder cavity. There may be considerable trigonal distortion resulting in great difficulty in the discovery of the ureteral orifices.

The mucous membrane often takes on a dusky hue from congestion and there commonly are great tortuosity and increase in the size of the mucosal blood vessels. Often, these amount to true varicosities. In the presence of ureteral dilatation there may be marked gaping of the ureteral openings.

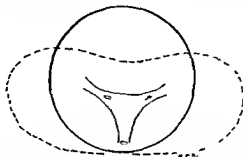


Fig 316 Outline to show the influence of pregnancy upon the lateral and antero-posterior diameters of the bladder. The dotted line is that of the bladder in early pregnancy and to a less marked degree, that of the multiparous female. After a number of years it shows a tendency to return to its former contour.

After pregnancy the varicosities usually disappear entirely, but the bladder assumes its former shape slowly, if at all. It commonly shows a greater diameter from side to side and the base of the bladder external to the ureteral ridges often continues to bulge downward, giving the impression that these areas rest on a lower plane than does that of the trigone. This change is particularly obvious in women who have borne several chil-

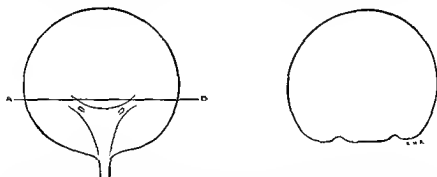


Fig 317—Drawing to illustrate the influence of pregnancy on the surface contour of the base of the bladder at the position of line A-B in the first outline. It will be seen that the bladder base on each side external to the ureteral ridges has been pushed downward. This is particularly evident in multiparae.

dren. One usually can tell that pregnancy has existed from the internal contour of the bladder in the absence of any other data.

**Intravesical Changes in Uterine Displacements.**—The normally placed uterus makes but slight change in the contour of the vesical wall beyond an occasional pushing in of its posterior aspect at the level of the cervix. At times, there may be a slight flattening of the bladder wall by the body of the uterus, but this is rarely pronounced except in the presence of ante-flexion, when there may be a decided area of convexity.

In the presence of uterine retroposition or retroflexion there usually is a slightly more perpendicular plane to the trigone and a greater inward convexity of the posterior wall at the level of the uterine cervix. The posterosuperior wall in this condition presents a greater concavity than in the presence of a normally placed uterus.

In the presence of downward displacement of the uterus there may be a slight inward bulging of the upper posterior bladder wall, but the most marked vesical change is to be seen on the bladder base. This is definitely on a much lower plane than the vesical outlet and, in the presence of marked prolapse, the trigone may pass perpendicularly downward from the bladder opening. This condition, true cystocele, may be associated with residual urine and a marked dilatation of the basal blood vessels. Commonly there is an associated chronic basal cystitis.

In the presence of minor grades of cystocele, and even the more marked grades, it is well to exercise considerable caution about attributing an associated cystitis to the bladder deformity alone. The writer has seen an unfortunate number of such patients subjected to one or several plastic

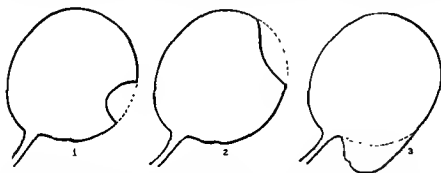


Fig. 318.—1, Pushing in of the posterior bladder wall by the cervix of a retroverted uterus. 2, Pushing downward of upper posterior wall by an anteverted uterus. 3, Vesical base in the presence of cystocele.

operations in an effort to cure cystitis that was, in reality, due to infection in the upper urinary tract, usually renal tuberculosis. So commonly has this occurred, that he has adopted the rule of proving the upper tract negative to any infection before urging a plastic operation for the bladder deformity if there is an infected urine.

**Minor Changes in Intravesical Contour.**—In order to understand certain minor changes in intravesical contour one must be decidedly familiar with the normal limits of variation. For it is a fact easy of demonstration that all normal bladders are not alike. Particularly is this true at the base and around the vesical outlet. And it is more so in the male than in the female, for there is more similarity in the trigonal and vesical outlet pictures in the latter.

Not only must one be thoroughly familiar with the normal variations, but he must develop a visual acuity for bladder pictures that enables him quickly to discern slight concavities and convexities of surface. To do this requires an intimate knowledge of vesical surface highlights and shadows and the utmost familiarity with the particular cystoscope one uses.



There is much of diagnostic value to be obtained from a close study of the changes in basal and vesical outlet contour. Not only does disease make varying changes in them, but habit often paints easily readable pictures in these areas. Unless one is familiar with these pictures and the

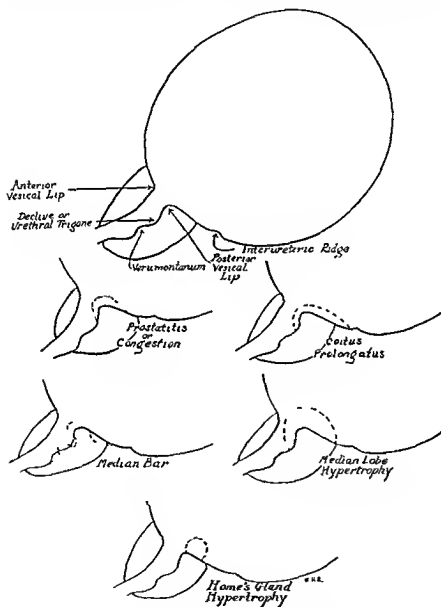


Fig. 319—Outlines depicting the changes in intravesical and intraurethral contour as the result of seven conditions.

things that produce them, he misses much in the finer points of intravesical study.

Let us, then, consider the contour of these regions in the male, for it is in him, mostly, that these studies are of the greatest value. If one turns

the distal lens of his cystoscope toward the base of the bladder posterior to the interureteral line and studies the surface from there to the posterior urethra in the normal male of good sexual habits and without prostatic infection or congestion he will observe the following changes in the surface. If he is well onto the posterior bladder wall he may observe a markedly convex surface due to fecal matter in the rectum. Passing his visual field forward he notes that the surface becomes very slightly concave from all directions. As he approaches the interureteric line he may see a slight transverse ridge but, more often, he observes only the change in color between the pale bladder mucous membrane and the pink of the trigone. He finds that this line marks the anterior limit of the slight concavity and that anterior to it he sees either a flat surface or one that is very slightly concave in the median line but not from side to side. As he approaches the posterior vesical lip he notes a definite convexity, in the midline, the vesical uvula, which, from its highest point, slopes away in all directions, merging gently posteriorly and laterally into the gentle planes of the surrounding surfaces. Anteriorly, it loses itself in the roll of the posterior lip of the outlet. If, at this point, the cystoscope is rotated in the vesical outlet, it can be seen, except at the posterior lip, that there is a gentle convex roll of tissue which gradually merges into the concavity of the contiguous bladder surface.

To complete the study of surface contour, it is necessary that the convex type of instrument be used, as the concave cystoscope cannot be used for visualization of the posterior urethra. One at this stage of his investigation should allow the fluid in the bladder to escape through the cystoscope, and then turn on his dilating fluid in order to secure sufficient urethral dilatation to make visualization possible.

If, now, he returns to the convexity described at the anterior trigonal angle, the so-called vesical uvula, and draws his visual field toward the urethra, he encounters a short space in which he gets the red blur of transmitted light resulting from the proximity of his lens and light to the mucous membrane. After a short anterior excursion of the lens he will note that his visualization improves and that a large transverse roll of convexity drops precipitously, and without shelving, into the postmontane fossa. Here, it will be observed that the floor of the urethra shows lateral concavities and a median convexity which increases as the lens is drawn forward until the verumontanum pouts up into the lens and again causes a red blur of transmitted light. If, at this point, the lens is rotated laterally, the sides of the verumontanum can be seen to drop precipitously to the concave lateral sulci. If further rotation is made the lateral urethral walls seem to rise straight or with slight concavity from the sulci.

Such, with but very slight individual variations, is the contour of the normal bladder base and urethra. And it is important that one thoroughly familiarize himself with the average width of the median prostatic commissure, as well as of the rest of the true vesical outlet. For it is upon much of this familiarity that he must base his solution of the causes of minor changes from the normal.

Also, one must develop a familiarity with the appearance of the normal circulation in these parts, particularly in the trigone, so that he immediately senses minor changes in these small blood vessels. Some of the con-

ditions that have to do with contour changes also are accompanied by characteristic circulation changes, and one must see the complete picture if he properly would interpret it. He will observe that the trigonal venules run convergingly from behind forward and he easily can determine how readily the venous return through the vesical outlet can be influenced, by allowing the cystoscope to press on the posterior lip and observing what it does to the color of the mucous membrane.

It must be further borne in mind that the prostate gland entirely surrounds the urethra and vesical outlet and that its upper posterior limit is at about on a line with the middle of the trigone.

Our final stone in the foundation for such closer studies is the question of age, for it well can be said that certain of these changes belong alone to certain spans of life. In fact, except for the very rare occurrence of congenital median bar, it can be said that changes in contour rarely are seen before puberty. For it is to be remembered that we are not here considering changes due to inflammation of mucous membrane. It is true that the habit of straining at urination in childhood makes changes in

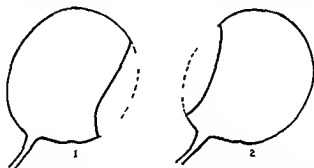


Fig. 320—1 Pushing in of the posterior vesical wall in the male by a full rectum. 2 Pushing in of the anterior vesical wall by infection or other pathology in the pre-vesical space.

vesical contour, but such changes confine themselves to trabeculation of the general bladder wall and hypertrophy of the ureteral ridges and inter-ureteric ridge. They do not change the surface contour of the trigone to any marked degree and they do not involve the vesical outlet.

At the other extreme of life one sees more commonly those changes in contour that have to do mostly with median bar, prostatic hypertrophy, neurogenic factors, or interferences with urination, which are all considered in their appropriate places.

Thus, it will be seen that we, in a sense, have limited our present study to the period of more or less active sexual life, though not all of the things under consideration are of truly sexual origin. And, as there seems to be no definite late limit to this period, we shall have to allow some of the more youthful older men to linger where life is more than memories.

Recalling that our cystoscopic journey of configuration studies is from within outward, with various side glances from time to time, let us see what diagnostic value we can obtain from this submarine topographical tour.

Starting with our most common and, perhaps, our slightest change, we note that our promontory at the anterior trigonal angle, the vesical uvula

is not a dome-shaped body. It has ceased to slope away at the sides—the slight convexity of surface extends from one side of the trigone to the other. It still merges in the normal manner with the posterior trigonal area. We find that the posterior and lateral margins of the vesical outlet are much broader than normal and, as we see the anterior face of the median commissure, we note that we can make out the minute openings of the prostatic follicles and that they are seen more plainly in the lateral sulci. We also get the conviction that the verumontanum is considerably larger than our idea of normal. And, altogether, we have no doubt regarding prostatic infection and we can prove the point by finding that the prostatic secretion is full of pus.

Pursuing such a journey on another patient we find that our inter-ureteric ridge, as well as the ureteral ridges, are rather more prominent than we expected to find them. Of course, this is not so in the earlier stages of the lesion which we have in mind, but later it always is. In the middle of the trigone a transverse crease is noted, and there is an obliteration of the lateral sloping of our vesical uvula. The posterior vesical lip strikes us as being narrow, elevated and it slightly shelves on its urethral aspect. The distance between the median commissure and the verumontanum is much shorter. The verumontanum is small and stands up rather prominently. The prostatic openings are easily visible, in fact, some of them are quite large and the mucous membrane surrounding them is much paler than we are accustomed to seeing it. And, if we have noted no residual urine, it would be well to look for it at a later date if the picture is pronounced. We make sure the patient is not straining as he, in this way, can produce much of the picture we have in mind. This has been pointed out under the consideration of Median Bar.

We have no doubt what the story has been. Years ago our patient had a pronounced infection of the prostate gland, an inflammation that not only involved his glandular mucous membrane but caused much infiltration of the interstitial structures of the prostate. And, as the years went by, this round-cell infiltrate pursued its natural bent and became fibrous tissue. The fibrous tissue contracted until our patient developed what we are pleased to call a median prostatic bar.

In another patient we note that the vesical rim is much broader than it should be, and its mucous membrane looks almost puffy. The urethra seems redder than is usual and the verumontanum not only is greatly increased in size, but we get the idea that it is broad and flattened on the top. We cannot see any evidence of the prostatic openings. We gather the conviction that our patient is addicted to the "solitary vice" and on inquiry we usually find that he is rather excessive in his indulgences in his lonely pleasure.

In another patient we notice that the entire trigone is slightly convex. The convexity extends even to the ureteral ridges and smooths out their beginnings. The venules stand out very prominently, even onto the ureteral ridges. (Fig. 301.) The posterior vesical lip is extremely broad, as are also the lateral aspects of the bladder outlet. The posterior urethra seems less capacious than it should be, and we are sure it is because a swollen prostate gland is pushing it in. The verumontanum is large.

The patient complains that he has to get up several times at night to

empty his bladder and cannot go to sleep for some time thereafter owing to a hot uncomfortable sensation at the 'neck of his bladder

One does not have to ask him many questions, for the picture tells the history. For many years (always more than five) he has been practicing prolonged intercourse

If the verumontanum is the same as is found in the masturbator the assumption is safe that he largely has lost his power of erection and masturbates in order to get an erection so that he can indulge in his prolonged coitus

As time elapses, this individual loses his ability to enjoy intercourse or in fact even accomplish the act but he will continue to masturbate. The verumontanum will stay the same, the convexity of the posterior trigonal region will gradually shrink into a concavity, so that its contour will become the same as seen in prostatitis alone, but the dilatation of the trigonal venules will continue for a long time and give the key to the solution of the puzzle

Again we note in a young man a contour picture similar to the one noted in prostatitis. But the trigone is redder than it should be, the mucous membrane of the broad vesical rim seems puffy (looking as though it would ooze fluid if its surface were broken), the urethra is reddened and the verumontanum is enormous. But we fail to make out any prostatic openings, as we did in the individual with prostatitis. Viewing the picture in its entirety we feel sure that we are dealing with what Young has called 'the lover's prostate', the result of those frequent and prolonged periods of ungratified desire that strew the prenuptial pathway when desires are strong and ideals high

**Cystoscopy in the Presence of Bleeding**—That one should feel today that there was the least need for repeating the statement that has been repeated for years, to the effect that every patient with hematuria should have a cystoscopic study is a sad commentary upon the intelligence of some physicians. Just how many, it is difficult to say, but if one might judge from the number of patients encountered by the urologists in whose past histories there appear the records of a totally unstudied hematuria there is reason to believe that it is a lesson that has not been learned by a large share of the medical profession. Perhaps much of this is the fault of the urologists in not having carried to those in other fields the message in a way sufficiently dramatic to make it not only stuck but be followed. Certainly from his standpoint, there is enough of drama to pass along to those of his brothers who do not encounter it in quantities

The cystoscope has been a practical instrument since Nitze added the cold lamp to the formerly unsatisfactory ones in 1886. It has been in such common use in this country for the last thirty five years that every graduate of medicine must know of it and of the studies it makes possible. And yet in 1939 we still are repeating, not alone to the students but to those who have been in practice for varying periods of time that old slogan

Hematuria means cystoscopy

Of course, those who cry this slogan so loudly know there are some few patients who cannot or should not be subjected to a cystoscopy. But they are so very few as compared with the number of cases of hematuria that they should not be allowed to detract from its force. When in the

bladder of an individual who has had repeated attacks of hematuria over a number of years and has been attended by physicians of wide reputation, one sees a number of perfectly benign papillomata and one or two that have become hopelessly malignant—well, he, at least, cannot be blamed greatly if his blood-pressure rises a few millimeters of mercury. When he encounters the same thing in the kidney pelvis, a renal tuberculosis that has dragged its possessor down almost to a physical shadow with enough misery for a hundred sick people, a vesical stone that has grown far too large for other than operative removal, renal calculi that have brought destruction to one kidney and almost to the other, and a host of other things equally sad and dramatic, he could be pardoned if he felt that some doctors had much to learn, or worse. And, yet, these things are of such common occurrence, even today, that there is a great need that the old slogan again be cried loudly and long from one end of the land to the other. For, most assuredly, hematuria is not a diagnosis. It is a red flag of danger and it commonly means just as much for the individual's safety as does respect for the red signals by the engineer of a midnight express for those whose lives are in his hands.

Beyond question, in the absence of definite contraindications to the performance of cystoscopy, one should be done in every case showing macroscopic bleeding and in those cases with microscopic hematuria in which the cause cannot be determined otherwise. Such studies should be preceded by a careful microscopic study of the urinary sediment to rule out the possibility of hemorrhagic nephritis, as indicated by the presence of blood casts of the renal tubules. Upon several occasions the writer has had sent to him for cystoscopy patients in the early stages of an acute nephritis whose urines showed countless blood-casts. In such cases cystoscopic study may do much harm, for most of these patients are on the verge of a serious illness which may be made worse by such a study.

In other cases, even where temporary contraindications to cystoscopy are present, the patient should be kept under observation until such time as the required urologic studies safely may be carried out.

Wherever possible it is of most value to cystoscope the patient when he is bleeding. This is particularly true if the blood is coming from a kidney, for it is not always a simple matter to determine its source when there is no bleeding or when it is microscopic in quantity. The passage of a ureteral catheter usually causes the appearance of enough red blood-cells in the catheterized kidney urine to keep one in doubt as to the true source of microscopic bleeding unless roentgenographic studies reveal the cause.

It is well not to be too sure that the source of the blood has been determined when blood is seen to flow from the posterior urethra into the bladder. This is of frequent occurrence during a cystoscopy in patients who have not had hematuria. It is one of the pitfalls into which the writer once stumbled, much to his later chagrin. He was asked to study a physician who had had hematuria, though there was no evidence of it at the time of the study. The posterior urethral mucosa was highly engorged and bled freely at the slightest touch. It was painted with 10 per cent silver nitrate solution and the patient did not bleed for some weeks, though he had been doing so almost daily before the study. When the bleeding

recurred the same procedure was repeated and there was no further bleeding

Two years later the doctor who sent him for study returned him so that the writer might feel the hypernephroma that filled practically the whole of the left side of the abdominal cavity. Prior to his first visit his x ray studies had revealed nothing. Further studies were not done because it was believed that the cause of his bleeding was known and corrected.

Cystoscopy in the presence of massive bleeding often is no simple matter and one does well to be prepared to fulgurate bleeding points if the blood comes from the bladder. Blood rarely comes from a ureter so rapidly that it is not possible to determine the side of its origin. In the presence of freely bleeding vesical lesions there often is much difficulty in keeping the dilating fluid sufficiently clear for good visualization. Where this is so it usually is possible to check the bleeding somewhat if not entirely by allowing some 1:1000 silver nitrate solution or a solution of 1 dram of adrenalin to the pint of water to remain in the bladder for five or ten minutes. This can be done through the cystoscope and when the fluid is evacuated diagnosis usually is possible. Very carefully used air dilatation will serve the same purpose but the possibility of air embolism deserves serious consideration where there are open blood vessels. One may use mineral oil for bladder dilatation as this does not mix with the blood but he must not do fulguration while any of it is in the bladder.

If blood clots of size are present and prevent diagnosis it is better to remove them by syringe suction through the multiple eyed catheter than to use such suction with the cystoscope. Its single fenestration makes this a dangerous procedure in the presence of a vesical tumor.

At times in the presence of free bleeding from the bladder it is best to put the bladder at rest by the insertion of an indwelling catheter and to delay cystoscopy until the bleeding has been controlled for several days. Frequently in the presence of bleeding it is possible by allowing the irrigating fluid to flow and holding the lens close to the bladder wall to make a moderately satisfactory visual study.

**Cystoscopy in Median Bar**—The technic of cystoscopy in the presence of median bar formation does not differ from that of cases wherein the bladder outlet is normal except that it may be necessary to depress the manual end of the cystoscope somewhat to cause the beak to ride over the elevated posterior vesical lip. The trouble comes with the making of a diagnosis in the minor grades of fibrosis and in this much care should be exercised if errors are to be avoided. When one sees papers in the literature entitled *Prefibrotic Bar* he realizes that there is a tendency toward a rather close drawing of lines particularly when either punch operations or electric excisions are being advised for such early suggestions of bar formation.

While not in any sense wishing to detract from the value of the observations of certain of his very good friends the writer cannot refrain from sounding a note of warning against too great a dependence upon the seemingly typical pictures of early prostatic bar so commonly seen at cystoscopy. Over a number of years there accumulated in the writer's files and in those of the University of Pennsylvania Urologic Department a great many histories of patients having a supposed early bar formation.

These patients were instructed to return for observation cystoscopy in a year or two, or the referring physician was asked to make a note of the condition for his future guidance. Unquestionably several hundred such cases were encountered.

A few years ago the writer saw a young medical student at examination time who was having much trouble emptying his bladder and who, upon cystoscopy, had 325 c.c. of residual urine and definitely had a typical cystoscopic picture of median bar. Because of the examinations yet to come, little was said to the student, but he was asked to return in one month for a cystoscopic check-up. This he did and, strangely enough, this study revealed neither residual urine nor any evidence whatever of bar. Following this several of those on whom a diagnosis of "early median bar" had been made were restudied and no bar was found. It was, however, observed that all these, or any other patients, had to do to develop the typical picture of early bar formation was to try to force some urine alongside the cystoscope. They could produce the phenomenon and erad-



Fig. 321.—Trigone showing the transverse crease in front of the hypertrophied interureteric ridge and the trabeculation so characteristic of median-bar obstruction.

icate it in a moment. It all depended upon whether or not the patient strained a little while the posterior vesical lip was being studied.

Certainly, such a possibility should be widely known. It seems an utter impossibility that even a small fraction of the number of "median bars" could have existed that have been removed since electric excision has come into vogue. Surely a patient with a picture of median bar and 325 c.c. of residual, both of which disappeared in a month which included no treatment, together with the easily demonstrable fact that it is easy for almost any patient to cause the cystoscopic appearance of bar, would tend to raise some question. Another possible source of error in this regard is the equally demonstrable fact that a good number of individuals do not completely empty the bladder during periods of nerve stress or when the doctor is present.

True median-bar formation is a definite, fixed clinical entity. "Early median bar" formation is more often a myth resulting from a certain type of muscular contraction during study. Just where "Prefibrotic Bar" belongs has the writer in doubt. Certainly the picture of it should be present



in the moments of absolute vesical outlet rest. It should not be possible for the patient to obliterate it by taking a few deep inspirations.

In true median bar there is a definite and fixed raising of the posterior vesical lip to the extent that the trigonal surface beyond it is either transversely creased or shows a transverse depression a concave furrow. On the urethral aspect the drop into the posterior urethra is sheer, at times the commissure overhangs and the verumontanum is definitely pulled toward the commissure. This shortening of the so called urethral trigone or postmontane space is the most characteristic feature of the condition. It is constant, does not shift with muscle action and the writer knows of nothing else that produces the change. When this picture is typical and constant, there usually is some residual urine varying from a few cubic centimeters in most cases to almost complete retention in some few. Usually there is hypertrophy of the ureteral and interureteric ridges together with vesical trabeculation.

Just what one should advise the patient depends upon the presence of true residual urine and the associated urinary dysfunction. If these are entirely absent the patient should be left under observation and if they are present he should have the bar removed by either a punch operation or an electric excision. After such an operation he still should be considered an observation case and be restudied in a year. Properly done both of these operations find this an ideal field.

**Cystoscopy in the Presence of Prostatic Hypertrophy**—The first thing to settle regarding the patient with prostatic hypertrophy is whether he should be subjected to a cystoscopic study or not. In a fair number of such patients cystoscopy is an extremely unwise procedure, in a few it may prove fatal. The subject has been discussed among the contraindications to cystoscopy but it is of such great importance that it is well worth repeating. To say that such a study should be made upon every patient before operation is to lose sight of some of the outstanding contraindications to the procedure. It is a fact that most of them should be cystoscoped at some time before operation but it never should be forgotten that there is a right time and a wrong time in some of them. And in the selection of this time much judgment is required if unfortunate results are to be avoided.

In a decision as to the need for or advisability of cystoscopy in the presence of prostatic enlargement many things must be considered. Of greatest importance is the patient's general condition. To subject an aged and possibly, uremic patient to cystoscopy without adequate preparation frequently will leave much to be regretted. The presence of marked acute cystitis also should make one pause and he should not plunge precipitously into a cystoscopic study in the patient with acute urinary retention in the absence of infection without considering the probability of a marked reaction for the next few days possibly longer. Nor should the cystoscope be resorted to in the presence of chronic retention with the idea of relieving the retention at the same time. With the amount of teaching that has been indulged in regarding the dangers of quickly emptying such bladders it might be assumed that no one would think of doing these two things at the same sitting. But experience has shown that it occurs far too frequently. In such cases cystoscopy should follow gradual decompression by days or weeks.

No patient with residual urine should be cystoscoped without the most scrupulous care to avoid added infection. The precipitation of a fatal sepsis is a very real danger in some and it, usually, may be avoided by leaving several ounces of 1:3000 neutral acriflavine solution or some other suitable antiseptic in the bladder at the end of the study.

Assuming that the patient is truly a fit subject for a cystoscopic study, the greatest gentleness should be used in its performance. The danger of hemorrhage in patients with enlarged prostates is very great and it requires but little trauma to induce it. The tendency to the development of epididymitis in these patients also is a real one, and its incidence bears a direct proportion to the degree of vesical overdistention brought about by the dilating fluid used in the study.

In these days in which no one type of operation is used for all cases, cystoscopy holds a place of added importance. Not only is it of service in the discovery of the type of obstruction really present at the vesical outlet, a thing that rectal palpation rarely reveals, and the discovery of things that have a direct bearing upon the patient's operative outlook, but it has become the one means whereby the appropriate type of operation can be chosen. In no other way can one decide intelligently, whether the case is appropriate for electric excision or for open operation. And, if he is truly an operative case, a properly based decision as to whether he should have a suprapubic or perineal prostatectomy can be arrived at solely in this way.

In the cystoscopy of patients presenting the rectal or symptomatic evidences suggestive of prostatic enlargement, one is interested in a number of things if he is to obtain a complete diagnostic picture. Not only is it important to prove that the patient's symptoms are due to hypertrophy, but it is almost of equal value to determine the true type of the lesion, how much damage has been done to the bladder and whether or not there are vesical calculi, tumors, diverticula or any other associated pathology present. Upon these things must depend the decision as to just what should be done for the patient. Assuredly, it is not good surgical judgment to say that, just because there exists a vesical outlet obstruction, the patient must have either an electric excision of the obstructing tissue, a suprapubic or a perineal prostatectomy. The art has advanced far beyond a point where one may justify a given type of operative procedure just because it is the fashion of the day or the one he likes most. There are patients in whom each type of procedure has its own definite place and in whom other types of relief offer far less, or nothing at all.

Thus, it will be seen that the patient's future life and health may depend upon the type of surgical interference chosen, and that the formation of proper judgment depends not alone upon the mere proof of hypertrophy but upon a determination of the type present and all of those local conditions that may precipitate failure if the inappropriate is carried out. It is only by a careful determination of such things that operative procedures can be made to bear a less unsavory reputation than they now so commonly do. Mortality and, in a larger measure, morbidity following prostatic operations depends as much upon proper diagnosis as upon the skill of the operator. No matter how cleverly an operation may be done, the greatest good should not be expected unless it is the proper operation for the given case.

*Passage of the Cystoscope*—Nowhere in all of the art of cystoscopy is gentleness of greater value than in the introduction of a cystoscope into the bladder of a patient with prostatic hypertrophy. The instrument never should be grasped so firmly that digital tactile appreciation is obtunded. From the moment the tip of the instrument passes through the cut off muscle it is in a canal of unknown size and direction, a canal the walls of which present countless dilated, thin walled blood vessels which if ruptured, may bleed so freely, as to make cystoscopy impossible and perhaps place the patient in great danger. Such being the case, one does not do other than, with the utmost gentleness, let the posterior urethral lumen guide him. With all of his attention centered upon the sensation of progression, resistance or obstruction, as imparted to his fingers by the cystoscope, he carefully changes the direction of the manual end of the instrument so that it can advance. He never should use the least force in its introduction. He carefully judges of the consistency of the tissues it passes, on the alert to discover any areas of density that may bespeak malignancy, fibrosis or, perhaps, tuberculous infiltration.

In the presence of purely bilateral lobe hypertrophy he may not have to depress the manual end of the cystoscope any more than is necessary in patients who have no enlargement. But just so soon as the median lobe shares in the hypertrophy this procedure becomes necessary. At times, the instrument may have to be depressed to such an extent that its direction almost approaches the perpendicular before the beak is felt to enter the bladder. In depressing the manual end so markedly there is a slight reduction in one's ability to appreciate the sensations conveyed by the instrument as it is necessary to grasp the instrument a trifle more firmly, and even greater efforts to prevent trauma should be exercised.

In the presence of herniation through the vesical sphincter, and occasionally, in true intracapsular hypertrophy, the posterior urethra becomes greatly elongated so that the cystoscope barely enters the vesical outlet. Rarely is it so long that the instrument does not reach far enough to study the vesical outlet and, less readily, the bladder itself.

The necessity for local anesthesia depends upon the patient and the light handedness of the cystoscopist. There is no reason why cystoscopy in most cases of prostatic hypertrophy should be any more painful than in normal cases. Rarely are these bladders intolerant to dilatation, as one does not cystoscope such patients during an acute seizure of cystitis. In them the presence of vesical calculi rarely increases the discomforts of cystoscopy, for stones if present, usually lie where they do not greatly annoy the sensitive trigone. Unless of enormous size they rarely add difficulty to the examination.

*Study of the Bladder, Vesical Outlet and Urethra*—It is assumed in this description that the convex type of instrument is being used. The concave instrument prohibits study of the posterior urethra and the straight cystourethroscope is a particularly dangerous instrument in the presence of hypertrophy. It further is assumed, that the patient has been given an opportunity to pass all of the urine he possibly could just before the introduction of the cystoscope.

As soon as the instrument reaches the bladder any residual urine present is allowed to flow out slowly and is measured carefully. The bladder hav

ing been emptied, the dilating fluid should be allowed to flow into it and then be evacuated if the urine is cloudy or if the terminal fluid is turbid. If the urine is clear, this is not necessary and visualization may be begun at once while the bladder is being dilated. By watching the bladder wall as it stretches to accommodate the fluid, one may obtain valuable data as to its thickness, its flexibility and the character of its mucous membrane. As dilatation becomes more complete, an estimation of the amount of back-pressure damage present, as evidenced by the degree of trabeculation or the presence of diverticular openings, can be made. If it is possible to see them, the ureteral orifices should be studied. In the presence of great median lobe hypertrophy this may not be possible.

When the bladder has been studied, the vesical rim is brought into the field and the visual field is so moved as to take in its entire circumference. It will be remembered that the normal vesical outlet presents practically a ring with its posterior aspect flattened or slightly raised by the urethral



Fig. 322.

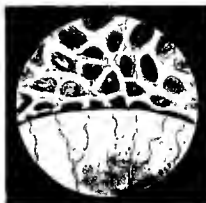


Fig. 323.

Fig. 322.—Anterior cleft at the vesical outlet seen in prostatic hypertrophy.

Fig. 323.—Median lobe hypertrophy with marked vesical trabeculation.

uvula as the cystoscope is rotated on its long axis. And any departures from this are to be studied.

In the presence of bilateral hypertrophy that has herniated through the sphincter or even approaches the sphincter from the urethral side, the anterior portion of the outlet presents a deep cleft between two rounded or, at times, slightly irregular masses of tissue. (Fig. 322.) Following these laterally, one sees them as globular masses ending either in a slight cleft at their posterior extremities or merging into the posterior mass formed by the enlarged median lobe. (Figs. 295 and 329.)

The posterior aspect of the vesical rim depends upon the amount of true median lobe hypertrophy. This causes a large, rounded roll of tissue underlying the trigone. In some cases, it pushes up sufficiently to cause a deep transverse sulcus with the mucous membrane of the bladder base, usually at the site of the interureteric ridge.

This contour, upon rare occasions, may be caused by subtrigonal prostatic abscess. In its milder grades, it may be slightly suggested by prostatitis and by the habit of greatly prolonging the act of intercourse. Thus,

one has no doubt in the presence of the more marked degrees of median lobe hypertrophy, but must study more closely the less typical enlargements, if he would avoid error

Hypertrophy of the subtrigonal (Homes) glands gives an entirely different cystoscopic appearance from that of median lobe hypertrophy,



Fig 324



Fig 325

Fig 324—Enlargement of the right lobe of the prostate showing marked varicosities

Fig 325—Hypertrophy of the subcervical lobe with slight lateral lobe involvement

though it is a simple matter to overlook this difference (Fig 326) In this type of hypertrophy there develops a mass in the midtrigonal area that pushes directly up, making definite clefts on its sides with the lateral margins of the vesical rim. As the mass increases in size, it becomes definitely pedunculated, so that one may be able to take a visual journey from



Fig 326—Schematic figure to illustrate trilobar prostatic hypertrophy and the pedunculated mass due to hypertrophy of Homes subtrigonal gland

a deep cleft on one side over a large rounded mass to an equally deep cleft on the other side. Such a contour may be simulated somewhat in the presence of a nodular enlargement of the median lobe, but this never becomes definitely pedunculated (Fig 325)

Young has devised a method of charting the outline of the vesical opening in such a way as graphically to record its abnormalities. This is of

much value in the matter of permanent record-keeping and, perhaps, in conveying to the referring physician a better idea of his case. With but little experience it is possible for one to obtain a composite picture of the contour of the vesical outlet that leaves him in little doubt regarding the type and size of its obstructing tissue.

These points being determined, it is of considerable importance to study the urethral lumen. Before this is done the bladder should be emptied, so that there is room for the fluid used in obtaining sufficient urethral dilatation for good visualization to flow back into it without overdistingending that viscus. For, as has been said, overdistingention of the bladder during cystoscopy is prone to precipitate an attack of epididymitis.

After the bladder is emptied, the cystoscope, with the dilating fluid flowing through, is gently drawn into the posterior urethra. This should be done by starting with a visual field that includes the upper extremity of the median lobe and keeping the midline in view until the visual field is



Fig. 327.

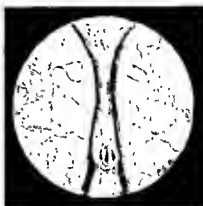


Fig. 328.

Fig. 327.—Urethral encroachment due to bilateral prostatic hypertrophy.

Fig. 328.—Intra-urethral encroachment of the lateral prostatic lobes.

that of the urethral aspect of the median commissure. In this way an excellent idea can be had of the breadth of the median commissure. Usually, it is not necessary that the cystoscope be rotated. Particularly is this true if the lateral lobes are enlarged, for the urethra then is practically a slit in the midline. The lateral walls of the urethra bulge in, and deep down in the cleft can be seen the verumontanum and, perhaps, a small portion of the urethral floor. In the presence of marked lateral lobe hypertrophy this picture is so typical as to permit of no doubt. In the minor grades of hypertrophy there is more room for doubt. It should not be forgotten that the tissue surfaces are in such close proximity to the lens as to undergo much magnification, and one easily may be misled by minor lateral wall convexities. In the presence of much prostatic fibrosis the normal-sized lobes commonly are pushed toward the urethral lumen in such a way as to be rather convincing of the presence of early hypertrophy. Under such circumstances, the most careful rectal study should be made, for these prostates usually are so small as definitely to negative hypertrophy, despite the rather typical urethral picture.

Having carefully studied the prostate from its intravesical, intra urethral, and rectal aspects, and having determined it to be the seat of a benign hypertrophy that needs operative intervention, just what is one to advise the patient? In the present state of our knowledge few things require more careful judgment than a determination of the proper treatment best suited for a given case of prostatic hypertrophy. Presenting, as these patients do, such a variety of conditions other than the genetal physical picture, it is in no sense an easy matter to lay down fixed rules of procedure. Particularly is this true since electric excision has been so highly popularized as almost a minor operation, a thing that it is not now and is not likely to become. Just where this operation should begin and stop in prostatic hypertrophy is not as yet settled. That it has been used where it should not have been is as would be expected, and this, perhaps, has been of the nature of a disguised blessing. We generally learn more from our failures than from our successes, and nothing will serve more quickly to shake a procedure to its proper level than an increasing number of un-



Fig 329—Linear fulguration cuts of the median lobe for very mild grades of median lobe enlargement with small amounts of residual urine. Often this is of value in the lesser grades of median bar formation.

toward results. These are accumulating at rather a rapid rate, and it is probable that even those who are most enthusiastic today will agree that it has not relegated true prostatectomy to the limbo of surgical memories.

Electric excision, at its best, so far as prostatic hypertrophy is concerned, is too young for a final evaluation to be placed upon it. Whether or not the results are permanent is a question for the future to settle. However, one would be both unwise and unfair to confine its scope to too narrow a field. At the same time, one who observes the results of the two methods, excision and prostatectomy, cannot help feeling that the patient with the massive hypertrophy with intravesical herniation has a better chance for the future if he has survived a prostatectomy. And one does not use the word "survived" to suggest that electric excision carries no mortality.

Considering, then, that prostatectomy has not been totally replaced by this newer method, it is necessary that the cystoscopist be able to select those patients who are best suited for a perineal prostatectomy and those in whom a suprapubic prostatectomy has more to offer. Parenthetically, it might be mentioned that that age-old controversy of perineal versus

suprapubic prostatectomy has lost its rancor, and that neither occupies the exact center of the stage to the exclusion of the other. In fact, it is rather a simple matter to classify them in points of comparative usefulness. The simplest way to do this is to consider those cases in which the entire hypertrophy is intracapsular, and that have no vesical calculi and, perhaps, diverticula, as appropriately perineal cases. In advising patients of this, however, it should be remembered that perineal prostatectomy is a procedure requiring much skill and experience, and that it is unwise to turn the patient's mind in this direction unless the one who is performing the operation is especially skilled with it.

Where there is definite intravesical herniation of any degree, vesical stone or marked vesical pathology, the suprapubic route is more likely to be productive of the better results. Whether or not the operation should be done at one stage or in two stages is largely a matter of associated bladder pathology and cardiorenal embarrassment.

Just where and how prominently electric excision should come into the picture depends upon a number of things that have been discussed under the heading of Prostatic Obstruction earlier in the book. Unfortunately, the writer cannot work up a degree of enthusiasm about it in hypertrophies of size, as many others seem to hold. However, he is in much the same position as is the general physician. He refers the case to the surgeon and, if there is postoperative morbidity, he must care for it. To date, he has had much to do along this line and the cases have not been confined altogether to those with great prostatic enlargement. Some of the bladder cripples had very little tissue that needed removal. They are not a happy group of patients.

**Cystoscopy in Vesical Tumor.**—The clinical chapter of vesical neoplasm is by no means an attractive one. It is disfigured by so much that need not have been as to make one wonder if it ever will be cleared up. Beginning with rather a widespread lack of appreciation of the importance of the most common announcement of its existence, hematuria, it is studded with fatalities largely preventable. For, in a large percentage of such cases, there occurs a period of months, often years, in which cure by cystoscopic measures is a comparatively simple matter. And in at least 75 per cent of these there occur attacks of hematuria that should lead to cystoscopic study but in many of which it is omitted for the simpler procedure of rest in bed, and medication.

In the presence of bladder neoplasm a great diagnostic responsibility rests upon the cystoscopist, for it is upon his judgment that the planning of appropriate treatment depends. No matter how wide his experience or how good his judgment, he is sure to make mistakes at times. His mistakes are most likely to occur in differential diagnosis in that rather wide zone between the typically benign and the typically malignant neoplasms. Such mistakes, however, almost never approach in gravity the mistake of making no study. Most often, these errors are due to one's trying to convince himself that a slightly suspicious-looking tumor is benign because he so dreads malignancy in this region. As the writer looks back upon the times he apparently let the wish influence his diagnosis, he sees the reason for his present attitude of casting the die for probable malignancy every time he is in doubt.



One who has familiarized himself with the appearance of benign papillomata is never in doubt when they are typical. When they fail to present this typical appearance doubts begin to assail him. These rarely are of great importance if he does not continue to try to convince himself for too long a period that he is making progress in their destruction by the means appropriate to the treatment of benign papillomata. Unquestionably, it is proper procedure to give the patient the benefit of such doubts by a few fulgurations, but nothing is gained by continuing them indefinitely. Few things are better established than that fulguration does not cure malignancy. Indeed, it often definitely stimulates the growth and more often, it greatly increases the patient's vesical discomfort.

Mistakes are made, at times, in the presence of granulomata, bullous edema, rectovesical fistula and stones covered with mucopurulent material. Often it is in no sense an easy task to determine, from visual appearance, that such lesions are not truly malignant growths, which they often closely

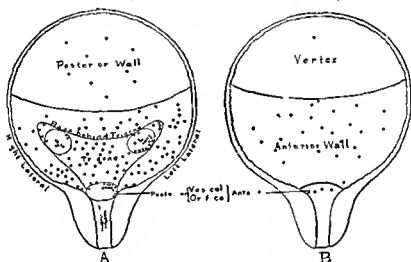


Fig. 330.—Diagram showing the locations of the growths in 209 cases of benign and malignant neoplasms (Young's Practice of Urology, W. B. Saunders Co., Philadelphia.)

simulate. Certainly, one should resort to biopsy wherever the least doubt exists regarding the true character of a vesical growth. Unless his experience has been sufficiently wide to justify him in having confidence in his accuracy of diagnosis, he does well to do a biopsy on all of them.

**Papilloma**—Regarding vesical new growths, one uses the word benign with some very distinct reservations. For, though they may begin as definitely benign outshoots of mucous membrane, our clinical experiences tell us that they must be viewed as potentially malignant. Indeed, it is the custom of some pathologists to view them as malignant from the start, basing their opinions on the frequency with which they show microscopic changes so suggestive of malignancy. There is much justification for such an attitude, even in their clinical behavior and, though one may pronounce them benign from cystoscopic appearance, he cannot assure himself that he is wholly correct, for some areas, even then, may have undergone some malignant change.

Despite all of this, it is still clinical custom to call them benign and to consider most of them as curable by fulguration or other destructive means. Their tendency to occur on other portions of the bladder or to recur at

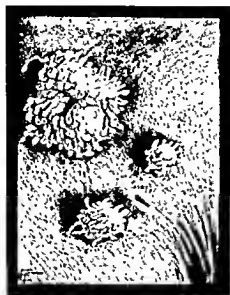


Fig. 331.—Multiple papillomata of the vesical wall. (Pilcher.)

the original site, is somewhat unique behavior for definitely benign cellular structures, and it is because of this that a pronouncement of cure should be made with reservations.



Fig. 332.

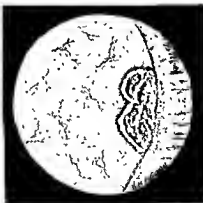


Fig. 333.

Fig. 332.—Papilloma on the left rim of the vesical outlet.

Fig. 333.—Papillomatous growth covered with incrustations. Destroyed by fulguration

True papillomata begin as slight polypoid projections of mucous membrane. As these increase in size their free surfaces put out elongated fimbriae, each containing a single artery and vein. These increase in size and number until they, at times, assume enormous proportions in comparison

with the rather small pedicle that attaches them to the bladder wall. Their distal ends wave freely in the intravesical fluids much as seaweed in the ocean. In color they range from almost a translucent white to a deep pink. And their outstanding characteristic is the freedom with which the entire growth may be moved without disturbing the contour of the supporting bladder wall. They give no suggestion of broad basal attachment and rarely are they associated with marked evidences of cystitis in the absence of previous bladder instrumentation. Blood may be seen at times oozing from either a fimbria or from the depths of the growth. Rarely is there urinary salt incrustation.

When a papilloma departs in any way from this decidedly innocent appearance it should be viewed with much more concern. Definite redness of the fimbriae, clubbing of them, incrustation, areas of sloughing among the fimbriae and edema or inflammation of the mucosa at or near the base are all highly suggestive of malignant change. If doubt exists it



Fig 334



Fig 335

Fig 334 Necrosis of a papilloma as the result of malignant change

Fig 335 Multiple papillomata of the bladder. It is rare for patients having such involvement to escape rather early malignancy.

is best procedure to obtain some of the growth for biopsy. If tissue is removed it should be done at the end of the study and bleeding should be controlled by fulguration if it is of any moment.

As a rule papillomatous growths undergo their malignant change in their pedicles. The pedicle becomes broader, the growth infiltrates the surrounding bladder mucosa in such a way as to cause surface edema which later is usually replaced by the papillary excrescences of true carcinomatous tissue. The fimbriae almost disappear and are replaced by coarsely granular excrescences often resembling the surfaces of nonmalignant granulomata. At times the growth becomes necrotic in areas. This change is not always a uniform one and it is not uncommon for some of the longer fimbriae to persist for some time.

Instead of a pedunculated growth there is now a definitely sessile one which usually slopes into an edematous mucous membrane. There commonly is an associated generalized cystitis and buds of papillary carcinoma make their appearance and spread along the mucous membrane. Later the

former papilloma is so thoroughly obliterated as to defy identification. It becomes just a part of a large, rough carcinomatous mass.

This change from the benign to the malignant is not always a rapid one. There commonly are encountered patients with typically benign growths and histories of hematuria dating back for five or more years. Such an occurrence, however, gives one no warrant for delay. There are papillomata that undergo malignancy within a few months of their first appearance.

Though papillomata may arise from any portion of the bladder, over 95 per cent of them occur on the mucous membrane of the lower third of the bladder. (Fig. 330.) They are extremely rare on the anterior bladder wall, and less so on the lateral margins of the vesical outlet. They occur with somewhat greater frequency in the upper part of the viscus. It is rather rare to find the only growth in this latter region. In the presence of multiple growths, there is a much wider distribution, in which the upper portion of the bladder commonly shares. They show a special predilection for the mucous membrane contiguous to the trigone but seldom



Fig. 336.—Fulguration of a vesical papilloma.

arise from the trigone itself. Rarely do they involve the ureteral orifice during the benign period unless they are secondary to papillomata in the ureter or kidney pelvis.

**TREATMENT.**—The accepted treatment for benign papillomatous growths is fulguration by means of the bipolar high-frequency current. Even in the presence of enormous growths, it usually is possible to accomplish their complete destruction by this means.

In the destruction of papillomata, one's hope is that he may be able to bring the fulgurating wire into direct contact with the tumor pedicle and, thus, devitalize the entire growth at once. In the presence of growths of even moderate size this is rarely possible with any degree of safety. The fimbriae so overhang the pedicle that visualization of it is not possible and in the use of this method the wire should be kept in sight, or nearly so, at all times if deep burns of the bladder wall are to be prevented.

Caulk has devised a wire snare for the fulguration of such growths which should make pedicle destruction more quickly and safely possible. Without such an instrument it usually is no difficult task to carry out much

tumor destruction at a treatment, though it may be a bit more tedious. By having a fair length of straight wire exposed, one, by a lateral movement, can contact a number of fimbriae with the wire still in view. The current then may be turned on and when the area becomes bleached this may be repeated in other areas. In this way much destruction is accomplished at a brief sitting.

One should resist the temptation to repeat fulgurations at too short intervals if he would avoid a complicating cystitis. It is far better to carry out a good fulguration and wait for three or four weeks to repeat the procedure. At the future treatment he usually is surprised at the marked reduction in the size of the growth and visual conditions usually are such as to enable him to do a far more complete destructive treatment than at the previous effort.

When the pedicle has been exposed it should be dealt with thoroughly. Too energetic an effort to make sure of its complete destruction, however, generally leaves a vesical ulceration that takes considerable time to heal. And, during its process of healing, it generally is surrounded by a zone of edema that is prone to suggest malignant change. One should not allow such an appearance, or the presence of other edematous areas from his having gotten his wire in contact with the bladder mucosa, to stampede him into the doing of foolish or dramatic things. It is far better to allow such cases a month or six weeks for healing and the obliteration of these seeming evidences of malignant infiltration. If, at the end of that time, the condition is worse, it probably is true carcinomatous tissue, but, even then it is safer to rely upon biopsy than to trust solely to visual interpretation.

Patients from whose bladders papillomata have been removed should not be pronounced cured. They should be considered observation cases for years. Recurrences of such growths are far too common to lull the patient into what, perhaps may be but a false sense of security. Assuredly, every patient should be apprised of the dangerous potentialities of benign vesical growths in such a way that, if he fails to return for observation at the appointed time the responsibility is his alone. It is even well to manage to get these instructions in writing to avoid possible later medicolegal annoyances. The writer has upon two occasions had much difficulty in dissuading patients from entering suit against physicians who had pronounced them cured without urging further observational visits.

The bladders of such patients should be inspected several times during the first year following papilloma destruction, twice during the next year and at least once a year for the next five years. If there have been no recurrences in that time the patient possibly is in no more danger than are other individuals who have had no vesical growths, but one should not rely too greatly on it. He is a wise patient who remains under observation for life. The writer has seen several patients in whom papillomata appeared from ten to fifteen years after others had been removed.

From the standpoint of prognosis the patient with one or two vesical papillomata even if they are large ones seems far better than that of the one who has many small papillomata. The recurrences in these appear with remarkable rapidity, and it has been the writer's experience that most of them eventually develop malignancy. In not a few, there are papillomata in either a kidney pelvis or ureter and sooner or later some firm

briae are seen to project from the corresponding ureteral orifice. So frequently does this association hold in the presence of multiple small vesical papillomata, that it is a wise procedure to subject such patients to the most careful urographic studies in a search for filling defects in the kidney pelvis and ureter. If upper tract papillomatosis is present, the bladder will not remain free from transplants until the involved kidney and ureter are removed. Sometimes, it will not remain free even then. If the kidney is not removed, it almost surely will become malignant and cost the patient his life.

Fig. 337.



Fig. 338.



Fig. 339.

Fig. 337.—Pedunculated adenocarcinoma of the bladder wall.

Fig. 338.—A large mass of infiltrating carcinoma of the left bladder wall.

Fig. 339.—Vesical carcinoma.

*Carcinoma.*—The most striking cystoscopic feature of vesical carcinoma is the multiplicity of the pictures it so often presents in the same case and at the same time. So closely do some of these pictures resemble nonmalignant bladder lesions that it is by no means an easy task to make a visual differentiation between them in every case. Though their outstanding characteristic is the breadth of their attachment to the bladder, one easily may let this feature mislead him. The granulomata, edematous areas surrounding fistulous tracts, bullous edema from any cause, bilharzial lesions, perhaps syphilis, and a number of other vesical lesions may have broad bases.

Thus they present the same characteristic sessility and many other visual features that make for confusion. On the other hand, pedunculation by no means negatives carcinoma, and the writer recently saw a smooth surfaced globular mass attached to the bladder base by a narrow pedicle which, upon section, proved to be an adenocarcinoma (Fig 337)

Thus, while one searches for sessility in carcinoma of this viscus, he does well to bear in mind that this is not truly differential, being characteristic of a number of lesions. He also makes no mistake if he exercises a like skepticism regarding definitely pedunculated tumors. It is a fact, however, that most vesical carcinomata show a broad attachment to the bladder wall if they have advanced to any great degree of development. In the earlier stages of malignant change in formerly benign papillomata the breadth of attachment is, perhaps lacking. Before much real change has taken place, however, there occurs an increase in the diameter of the pedicle. Associated with this change in the pedicle there is a concomitant change in the surface of the growth. Thus early, may be a sloughing of the fimbriae so that at cystoscopy one sees a whitish devitalized area fringed in some portion of its circumference by long fimbriae. Later, these may disappear and the entire surface become rough or nodular. Or, if sloughing of surface does not take place, the same eventual change may occur. The fimbriae become shortened and club shaped at first. Later these project but slightly above the tumor surface, giving it a mulberry appearance.

Around the base of such a growth, bladder wall infiltration occurs. The surface is raised, usually in irregular bosses and, owing to submucosal change interfering with the return of tissue fluids, there frequently is a surrounding zone of edema usually bullous in type. So closely does this edematous zone resemble the carcinomatous tissue that it is not possible to make an exact line of demarcation between them. Just what happens to the surface of the central tumor depends upon how much nourishment its mucous membrane gets. It may be a glistening red smooth surface, an irregular shaggy one, or one covered by mucous membrane that seems smooth and unbroken. Its color may range from a yellowish pink to an intense red. The entire growth may be covered by a whitish incrustation, or parts of it may be coated with mucus.

Carcinoma beginning in the bladder wall in the absence of previously benign papilloma is an entirely different story in its earlier stages, but in its later stages, the two approach one another in appearance so closely that it often is not possible to tell them apart. It is rare that one has an opportunity of watching the vesical appearance of carcinoma not preceded by papilloma from its inception. Such an opportunity was afforded the writer several years ago during a series of observation cystoscopies on a patient with trilobar prostatic hypertrophy. Although this was not in any sense an operative case, both the patient and his physician insisted upon cystoscopic study, at two month intervals. There being no residual urine and no other symptoms, aside from occasional brief attacks of urinary frequency there were no contraindications to such a procedure, and their requests were complied with.

After some months of this, there was seen in the bladder apex a smooth red area about 0.5 cm. in diameter that differed in no way from that so commonly

caused by the sucking of bladder mucosa into the fenestrum of the cystoscope in emptying that viscus. The red patch, however, was so placed that it could not have been due to such a cause. The area was not in the least raised above the surface at this study. The patient was asked to return in a month and, at this study, there was a very small hemispherical elevation in the center of the red area. Six weeks later there were four such elevations, the area was at last four times as large as when first seen, and there was the slightest suggestion of a beginning marginal edema. Two months later the area was at least 3 cm. in diameter and presented all the characteristics of a rapidly growing papillary carcinoma. In less than a year from this time, which was the last cystoscopic study, the patient died of carcinoma. Perhaps death was hastened by the fact that he also had a myocardial disease, nephritis, and an absence of pancreatic digestion. Against the last, he had struggled for years.

While this is the cycle of events occurring in the development of true papillary carcinoma, it may not be that of other forms of bladder malign-



Fig. 340.

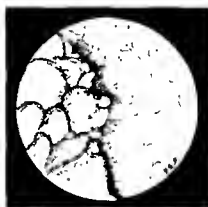


Fig. 341.

Fig. 340.—Papillary carcinoma. Note the irregularity in size of the nodules—a point of differentiation from edema bullosum.

Fig. 341.—Vesical carcinoma.

nancy. Growths are encountered that obviously could not have followed such a course but must have started and developed along entirely different lines. Particularly is this true of the growths of limited basal attachment which build up from the vesical wall without spreading extensively, growths covered with a shaggy mucous membrane or, perhaps, showing large surface sloughs. It is equally true of those slow-growing areas of dense malignant growths springing from the margin of leukoplakic areas or the epitheliomatous ulcerations surrounded by a dense, round margin, perhaps showing no circumferential zone of edema.

With a lesion presenting so varied an assortment of cystoscopic pictures as does vesical malignancy, most of which pictures may be simulated by other things of a nonmalignant nature, it is obvious that mistakes in diagnosis are made with the utmost ease. The importance of a correct diagnosis is as great as that of any human malady. And, unless one has a wide experience in such things, he does well to view every atypical case with a



doubt that is not banished until other things are positively ruled out and, perhaps, biopsy has proved the nature of the growth. It is a sad misfortune to pronounce some benign lesion carcinomatous. Several of the writer's earlier errors in this regard are still enjoying a degree of health

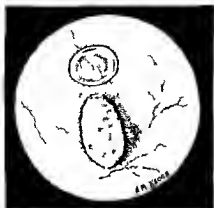


Fig 342

Fig 342 Recurrent carcinoma in the line of a vesical incision. It was thought to be a calcification on a stitch. Upon being touched with an ureteral catheter a shower of phosphatic flakes came away revealing the true nature of the growth. It spread with remarkable rapidity.

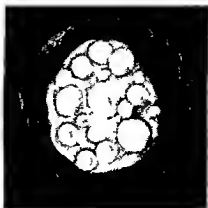


Fig 343

Fig 343—Mammillated vesical carcinoma of the apex of the bladder. The patient lived for nine years after its removal and died in an accident.

and comfort that give both them and their physicians a license to smile. A woman condemned to a painful death has since started a produce store which she has conducted for years. Another has driven a trolley car many thousands of miles since he was sentenced to a lingering death. And a



Fig 344—Opening from an infected rectal diverticulum commonly mistaken for carcinoma.

strange directing hand seems to take much delight in arranging meetings between us.

**TREATMENT**—Most assuredly the treatment of vesical malignancy is not fulguration. Within the last few years the outlook for patients with this,

formerly, most hopeless malady has brightened materially. The use of radium and deep x-ray therapy together or the latter alone has brought about cures, or apparent cures, in patients who, previously, would have been considered totally incurable. We, of course, are many leagues from the point where we can grow even moderately enthusiastic about the outlook of each individual. By concentrating the roentgen rays upon the involved area from many angles, encouraging results have been obtained in many cases seen early. Where there is extensive bladder involvement marked regression of growth is unusual. Checking of hemorrhage and reduction of bladder symptoms, however, are common enough to make the treatment well worthwhile, even if cure does not result.

Surgical methods seldom have produced cures, in the writer's experience. Often, they have added much suffering to the patient's remaining days.

**Cystoscopy in Prostatic Carcinoma.**—There rarely is need for cystoscopy in the diagnosis of prostatic carcinoma. Usually this can be established by rectal palpation alone. There do occur cases, however, in which the first sign of trouble comes as a difficulty in passing urine. In these patients the carcinomatous growth occurs in close proximity with the urethra and vesical outlet and, per rectum, no more than a slight suspicion of the cause is obtained. Unless the carcinomatous growth has broken through the mucous membrane, one may have to depend for his diagnosis upon the presence of changes of contour at the vesical outlet, or in the urethra, and the sensation of tissue density imparted to the fingers by the cystoscope. If the growth entirely surrounds the urethra, not only is there a definite sensation of tissue hardness but there is often a feeling as though something were rather firmly grasping the beak of the instrument.

This latter sensation is encountered only in carcinoma and tuberculosis of the prostate. It is so characteristic that one has no doubts regarding it. The only thing that is needed is to rule out tuberculosis. One is aided in this by the age of the patient, the fact that prostatic tuberculosis rarely occurs without an associated vesical, seminal vesicular, epididymal, or renal infection. Usually there are tubercle bacilli in the urine.

Residual urine rarely is found in tuberculosis but is common in the presence of this type of prostatic carcinoma. Bleeding from the cystoscopic manipulation may occur with both but is more likely to be profuse with carcinoma.

**Ureteral Meatoscopy.**—In the early days of cystoscopy, before we were so well aware of the possibilities for error, great stress was laid upon ureteral meatoscopy. The belief in the diagnostic value of the changes in the meatus was so great in some circles that men did not hesitate to urge operative procedures upon the kidney or ureter solely because they were able to see some change in one ureteral orifice. Meatoscopy almost developed into an art of itself and, then, as the result of an enormous number of mistakes in diagnosis, the pendulum swung to the other extreme where men failed to find value in it. We now know that this latter attitude was extreme, for the ureteral orifice often gives diagnostic data of the most valuable sort. The original mistake resulted from too great confidence being placed upon minor changes in the orifice or ureteral ridge.

To say that a certain change invariably occurs at the ureteral orifice

in a given type of ureteral kidney pelvis or renal pathology was drawing lines entirely too fine. It was thus that discredit of the value of meatoscopy was invited. One cannot as a rule differentiate between these by the orificial changes that occur in the presence of upper tract infections. About as far as he safely can go is to state that there is much evidence that a lesion is present in the upper tract of the side showing change. To say that the infection has advanced to surgical importance by this method alone is to stop short of making a real diagnosis.

In the presence of marked renal destruction from infection the ureteral orifice may show no visible changes. On the other hand, it is more common for there to be a change in the mucous membrane in the presence of active renal infection the products of which are thrown into the conducting structures. In the presence of tuberculosis the change may be associated with the occurrence of typical mucosal tubercles which in themselves are diagnostic. The renal process may be advanced without any orificial change. A staphylococcal infection may be associated with



Fig 345 Duplication of ureteral orifices

bladder evidences discernible to the skilled cystoscopist but if these are absent the orificial change is in no sense pathognomonic of that infection. Aside from these two infections there is no fixed appearance of the orifice or the bladder either for that matter that definitely shows the type or extent of the upper tract involvement.

Not only was great stress laid early upon the inflammatory changes in this region but men went to great lengths to prove that even minor changes in contour were of great diagnostic value. A series of changes were mapped out that were supposed to indicate with much infallibility such things as chronic pyelitis, hydronephrosis and the like. These gained some credence but it was not long before doubts crept in and today with but few exceptions such minor changes are used only as indications for further study. Indeed it may be said that but few changes in the ureteral area do more than point in the direction of such study except, perhaps in the presence of low lying ureteral stone.

It however must not be thought that ureteral meatoscopy is without value. For while the changes in this region either in color, shape or

function often are of the greatest aid in their suggestions as to the direction of study, at times they are in themselves diagnostic.

One does not hesitate to predict the finding of infection above a definitely reddened ureteral orifice in the absence of further vesical inflammation. Nor does he hesitate in the presence of cystitis with a striking increase of inflammatory evidences in the region of one ureteral orifice to make a like prediction. In the presence of a typical golf-hole orifice he has no doubt regarding a renal tuberculosis of long standing. When he sees a typical dragged-out orifice he knows there has been ureteral shortening and that tuberculosis is invariably its cause. He knows that a greatly swollen ureteral orifice and a ureteral ridge showing some submucosal hemorrhages usually bespeak a low-lying ureteral stone. He feels almost equally sure that a ragged orifice, in a patient just recovered from an attack of ureteral colic, means that the stone has passed. And, when he leaves these things, he wisely considers other changes as metely signposts indicating the direction which he must take to solve his problems.

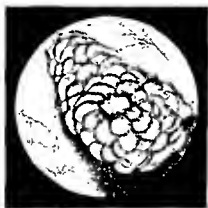


Fig. 346.—Marked bullous edema of the ureteral outlet and ridge with stone protruding from the opening.

The question of ureteral function as evidenced by the muscular behavior of the ureteral ridge and orifice, likewise has been given a magnified diagnostic importance. The more closely one studies the behavior of ureters in different individuals and the occasional differences in action between the two ureteral ridges in the same individual in the absence of upper tract pathology, the less ready he will be to place too great value upon them. While it is true that both ureters show an alternate contraction in most normal individuals, it is by no means rare to see one ridge fail to register any peristaltic wave whatever for a long period of time. It is, even, more common to see both sides fail in such action for many minutes after visualization has been started. Again, it is by no means rare to see, in the entire absence of upper tract pathology, both ureters go through their contractile rhythm without emitting a visible jet of urine. Further, it occurs under normal conditions that one ureter emits a jet of urine and the other, though normally contracting, fails to do so for a long period of time. It, then, may emit a large gush of urine and repeat its former action without result.

Even the position of the ureteral orifice may be a matter of importance in association with other evidences of disease or of acquired abnormality. It is, however, erroneous to think that every misplaced ureteral orifice is an evidence of either. For it should be remembered that congenitally anomalous locations of these openings are by no means rare, and that such aberrant orifices most commonly are so only on one side. The inability to find an orifice on one side does not always mean that there is no kidney on that side or that the ureter passes to the other side. The intravenous injection of some indigocarmine may show that it is on the rim of the vesical orifice or, even, in the urethra.

Thus, it will be seen that, while all of these things may, and commonly do, have great diagnostic value, they more commonly are only parts of the general study, parts that, if taken too seriously, have great potentialities for misguidance.

In a study of the ureteral orifice and the surrounding region it is wise to have a moderate amount of vesical dilatation. Too great vesical distention has a tendency to obscure ureteral peristalsis by flattening out the ureteral ridges so that the true muscular action is seen with difficulty. Not only this, but overdistention is prone to make invisible or to entirely prevent ureteral efflux. In order to see the latter to best advantage when the emitted urine is clear, it is well to manipulate the cystoscope so that one looks across the orifice instead of directly at it. To establish the fact that the kidney is delivering urine to the bladder is a matter of considerable importance. Particularly is this true in suspected stone in the ureter, for the mere proof that urine is being expelled into the bladder may be the determining factor in the wisdom of a course of watchful waiting.

Not only is one interested in a clear ureteral efflux but, in the presence of hematuria or pyuria, much knowledge of value may be obtained by some patient watching.

Thus, one is interested in the location of the orifice, its shape, size and appearance, the character of its muscular action, whether or not fluid comes from it, and the character of the efflux. And a careful study of all of these is essential to any carefully done cystoscopic study.

**Ureteral Catheterization**—Having located the ureteral orifice, one will usually find it a simple matter to engage the tip of the catheter into it. In order to do this the intravesical portion of the cystoscope is moved rather close to the orifice so that when the catheter engages no more than a centimeter of it can be seen. The tendency to use the directing finger of the cystoscope too early often makes the procedure more difficult. It is better to place the cystoscope as nearly on a line with the ureteral ridge as possible, advance the catheter and then make whatever further change in its direction may be necessary by raising the catheter guide.

If the catheter is not brought into the proper direction it will be found that it impinges on the posterior wall of the intramural portion of the ureter and instead of advancing freely, pushes the tissues away from the cystoscope (Fig. 348). A catheter that is advancing properly up the ureter does not change the distance between the cystoscope and the orifice. Thus, the moment one notices this space is being increased he knows that his catheter has met with obstruction. If this occurs before the catheter tip has passed beyond the intramural portion of the ureter (1.5 cm.), it usu-

ally is because the direction of the catheter is not that of this portion of the ureter. Such obstruction usually can be overcome by changing the direction of the cystoscope, by more sharply raising the catheter guide or by gently rotating the catheter in the cystoscope. Failing in this, as one sometimes does where the ureteral ridge runs more transversely than is usual, the cystoscope beak can be turned so that it rests on its side on the trigone when, by sharply raising the guide, the catheter usually can be made to advance. Another rather common cause for obstruction in this portion of the canal is that the cystoscope is held so far away from the ureteral orifice that the catheter has room to buckle or bend too much between the instrument and the orifices. (Fig. 348.)

Beyond the bladder wall it is quite unusual for the catheter to obstruct in the absence of some abnormality or pathology. To advance the catheter from the bladder wall requires gentleness but little skill, as it is just a matter of feeding the catheter into the ureter. Before one assumes, how-



Fig. 347.

Fig. 347.—Ureteral catheter properly directed. Not more than a centimeter of the catheter should be visible.



Fig. 348.

Fig. 348.—Obstruction of the ureteral catheter by the posterior ureteral wall owing to faulty direction and too great a distance of the cystoscope from the ureteral orifice.

ever, that an obstruction is an evidence of abnormality, it is best to withdraw the catheter a short distance and rotate it in the cystoscope as it is advanced again. At times, it is well to change to a catheter having either a round or olivary tip, as these often will advance beyond a point that holds a whistle-tip catheter.

It is to be remembered that the normal narrowing of the ureter where it leaves the bladder wall is such that it easily could stop the catheter by catching it in a mucous fold. The other normal points of narrowing (at the pelvic brim and the ureteropelvic junction) may, but rarely do, offer obstruction for the same reason.

As in the passage of instruments through a urethral stricture, it sometimes happens that, if one drops to a smaller size ureteral catheter when a number 6 has obstructed, he not only finds that it passes freely but that he can withdraw it and pass even a number 11 without difficulty. In fact, this is a good thing to do before he assumes that there is a real ureteral narrowing.

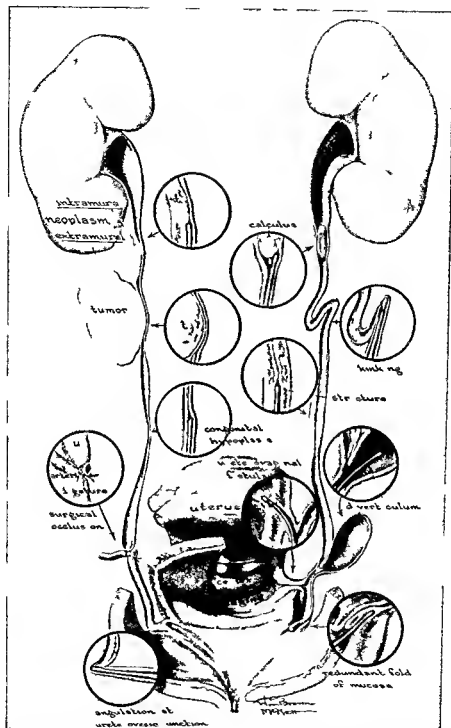


Fig 349 Dr Herman's striking schematic illustrations to show the possible causes for the obstruction to the passage of a catheter through the ureter (Herman The Practice of Urology W B Saunders Co Philadelphia)

In the patient of average height the catheter tip is just about at the ureteropelvic junction when it has been advanced 20 cm. At 30 cm. it probably is in the upper renal calix.

Much knowledge is to be gained about the behavior of the ureteral musculature if one carefully watches the fluid coming from the catheter at the different levels during its introduction. First, he should watch the ureteral orifice to make sure that urine is coming from it. Then, he should watch the bladder fluid being forced through the catheter channel before it is introduced into the ureter. This is of the nature of a steady dripping without pause. As soon as the second eye of the catheter has passed into the ureter this steady drip stops and nothing may come through the catheter until it has passed the intramural portion. At this point one will note the ejection of several drops, a pause and, then, more urine, followed by another pause.

If he has seen urine coming from the ureter prior to the introduction of the catheter and none comes from it when it is introduced into the lower ureter, he should wait a while before jumping to any conclusions. It may be, and probably is, collecting in the renal pelvis and, if he quickly passes the catheter onward, he is very likely to assume that the patient has a pelvic retention when things are perfectly normal. Occasionally, the mere shifting of the position of the catheter will cause the flow to start. If he suspects that his catheter may have become obstructed he can withdraw it into the bladder or can inject some sterile water through it to settle the doubt. In some patients, this failure of peristalsis lasts for as long as five minutes. Upon very rare occasions, the mere passage of a catheter into the ureter causes a true temporary renal anuria.

Having demonstrated that urine was coming through the ureter before the introduction of the catheter and that the ureter is capable of normal peristalsis, as evidenced by the pause between the drippings of urine from the catheter, the operator is in a position to advance his catheter into the renal pelvis. Just as soon as it passes the ureteropelvic junction the characteristic evidence of peristalsis ceases and the urine flows a drop at a time, as it did from the bladder. It should not be arbitrarily assumed that, if a cubic centimeter of urine flows from the catheter as soon as it reaches the kidney pelvis, the patient has a pelvic retention. Apparently kidney pelvises empty their urine into the ureter more from tissue pressure than by muscular action, and it is rather common to find a few cubic centimeters in the kidney pelvis of a recumbent patient. However, if the amount of fluid is 5 c.c. or more, one does well to suspect possible retention and prove or disprove his suspicions by an x-ray study. He may be able to settle the question, however, by withdrawing his catheter about 5 cm. below the ureteropelvic junction, raise the table so that the patient's renal areas are much higher than the bladder level, and watch for evidences of peristalsis. After this he usually will find that there is no suggestion of pelvic retention when the catheter is reintroduced into the renal pelvis.

It is almost impossible to pass a ureteral catheter to the kidney pelvis without causing some capillary oozing, and one need not be alarmed if he sees blood coming from his catheter. If he gently advances the catheter beyond this point, the blood usually will disappear, showing it to have been traumatic in origin.



Upon the rarest of occasions, the patient with a large ureteral orifice and a full bladder will have fluid pass from the bladder along the catheter into the ureter. If this happens, the fluid will be returned through the catheter with evidences of peristaltic propulsion. The writer once was greatly mystified by finding this expulsion from a ureter above which the kidney had been removed. If there is the slightest question about ureteral reflux, it is only necessary to empty the bladder to settle the matter.

**The Cystoscopic Study of Upper Urinary Tract Infections**—In the study of upper urinary tract infections one is interested in many things and, in order to learn most from the least amount of manipulative work, it is well to map out carefully a line of procedure for the case in hand. Having proved by a microscopic study of the sediments of the first and second glasses of voided urine that the abnormal elements present come from a point above the vesical sphincter, cystoscopic study becomes imperative unless there are definite contraindications. In no other way can the presenting questions be answered.

The careful urologist is not satisfied with assumptions based solely upon presenting symptoms. He knows how unreliable these symptoms usually are. Uppermost in his mind are four questions, viz., (1) Where do these elements originate? (2) What is their cause? (3) How much damage has been done? (4) What can be done to cure the condition? Particularly, he is interested in whether one or both kidneys are involved and, if only one, what is the condition of its fellow. While urography of some type may be necessary in many cases the possible cystoscopic data usually should be obtained before it is resorted to. The more careful and systematic the cystoscopic study, the less often is it necessary to subject the patient to the economic burden of roentgenographic procedures. This consideration has an added value where the urologist is not equipped for x ray work in his office.

Aside from the studies routine to all urologic cases, such as history taking, inspection, palpation, and the like, the writer proceeds with such cases as follows:

A careful microscopic study of the sediment of the first and second glasses of voided urine is made. (Usually a gram stained smear is studied, also.) The cystoscope is introduced into the bladder and, if any residual urine is present, it is measured and held for study. This is studied to avoid the possibility of pus in the second glass of urine having been pressed from a prostatic pocket by the muscular action of trying to expel the last few drops of urine. The bladder then is studied carefully, particular attention being paid to the ureteral areas and the character of the ureteral efflux.

The data thus gained usually are sufficient for the determination of the best course to pursue in further study. Though one is vitally interested in the microscopic study of the urines obtained from the kidneys separately, it is not always the best course to proceed at once with bilateral catheterization. Particularly is this true if a differential phthalein test is in order. If such a test is to be done it is carried out by the method of the differential phthalein test described under that heading. By this occluding catheter method one may do his phthalein test and also secure urine from each kidney separately for his microscopic and other studies, by passing the catheter a short way into the other ureter after the test period.

At the end of such a study one has elicited findings of so positive a nature that he usually is enabled to advise appropriate treatment without resort to x-ray study. If there still is doubt, he is more justified in subjecting the patient to further study of that sort. At least, he knows the source of the pus, roughly how much kidney destruction has occurred and whether the better kidney is capable of supporting life if the pathologic one must be removed.

It is not the writer's desire to detract in the least from the great value of x-ray studies. He knows only too well their importance, and he strongly urges them where there is the least doubt about the accuracy of findings otherwise obtained. Observation convinces him, however, that, far too frequently, they are used to avoid the other time-consuming methods of clinical study that often are more reliable in their results. Frequently, they place a far greater financial burden upon the patient than need be.

If the cystoscopist has done his own microscopic work he usually has a conception of his case that he could not get otherwise, and he is not assailed by the doubts that so often creep into the clinical picture when he must depend upon the microscopic interpretation of others. If stained smears of the urinary sediments from the specimens collected are studied, it is possible to add greatly to the completeness of the findings. Whenever there is the least possibility of tuberculosis as a factor, such stained specimen studies are imperative. The technic for the preparation of urine for the study of stained specimens of its sediment has been considered elsewhere.

From such a recital it would seem that a study of the type, of necessity, would consume a large amount of time, but such is not necessarily the case. The time required for the patient, even with a differential phthalein test, need not be more than forty minutes, and much of this is spent in collecting the urinary specimens. In other words, during most of the time, he rests on the table in no great discomfort because no manipulative work is being done. The amount of time one consumes at his microscopic work depends upon his office arrangement and his familiarity with the methods required. The writer seldom spends more than an hour or an hour and a quarter at the complete study, and he almost invariably can render a report of his case that satisfies the most careful of surgeons. Not only can he say which kidney is diseased, but he can say whether or not the remaining kidney will support life if nephrectomy is found advisable when it is exposed at operation.

Usually, he can say what the offending bacterium is. If there is the least doubt, he repeats his studies or resorts to intravenous or retrograde urography. Never does he guess or try to gloss over uncertainties. There is no surer way to court chagrin than to assume to know what has not been proved. There is no room for alibis from the cystoscopist at the operating table. Honesty and the safety of the patient demand that he be as frank with what he does not know as he is when his findings are not open to doubt.

It is recognized of course that roentgenographic studies commonly reveal positional or destructive abnormalities that otherwise would escape preoperative diagnosis. But there is a decided question regarding the advisability of following the above outline of study and immediately subjecting the patient to such a thing as a retrograde pyelography. It largely

is through such multiplication of procedures at a single cystoscopy that the more severe reactions are brought about. Assuredly, retrograde pyelography is not an office procedure and the urgent need for it has been reduced greatly by the intravenous method. In a measure, a false standard of the imperative need for both of these types of x ray study has been set by those highly equipped institutions wherein these studies can be done with a freedom that seemingly belies their cost.

**Differential Renal Function Tests**—In cystoscopic practice it frequently becomes necessary to determine the comparative functional capacities of the two kidneys. For, while our studies of their combined functional values may give us a fairly reliable general picture of the condition of these organs, they often help us little or not at all in diseases involving one kidney alone. The determination, therefore, of their differences in excretory possibilities holds a very important place in cystoscopy. It offers a safeguard of the utmost value to the patient. Often, it is the factor that determines the operability of a given case. Upon it depends much of the cystoscopist's reputation for accuracy in diagnosis, and it frequently is carried out in such a way as greatly to increase his margin of error, to the detriment of the patient and of the art.

Though the urines obtained separately from each kidney by catheterization lend themselves to such study as is applicable to the whole urine in regard to kidney function, such studies rarely are carried out. We have grown to rely so wholeheartedly upon our blood chemistry and dye excretion studies as indicators of the combined functional value of the kidneys, that we largely have lost sight of the information to be obtained by a comparison of the chemical studies applicable to the urines from the separate kidneys. To a noticeable degree, we have limited ourselves to the study of their microscopic and cultural characteristics, forgetting that their differences in specific gravity, urea and, perhaps, sugar content may be of great diagnostic value. This oversight, however, does not greatly limit the possibility of accurate determinations of function if our present methods of separate kidney study are carried out with proper regard for the possibilities of technical and interpretative error. For it is rare, indeed, that one's condemnation of a single diseased kidney must rest upon functional tests alone.

In America, we practically have restricted ourselves in these studies to a determination of the comparative speeds with which the separate kidneys can eliminate either indigocarmine or phenolsulfonphthalein. Of these two dyes, 'phthalein' has appealed more generally to the careful cystoscopist, largely because it lends itself more readily to a quantitative determination and thus favors greater accuracy in diagnosis. That it is of greater general value is attested by the prolonged and rather unsuccessful battle that has been waged by the admirers of indigocarmine to convince the rest of the profession of the superiority of their favorite. In judging of this question one should realize that although each dye has very definite advantages in some cases, each is susceptible to faults in technic and interpretation and both greatly can mislead.

Those who pin their faiths upon indigocarmine are largely, though not invariably, influenced by the greater convenience of it. They place great value upon the so called appearance time—the time elapsing between its

injection and its appearance in the urine from the separate kidneys. That this may lead, at times, to errors in diagnosis is beyond question. For it often happens that infection of a kidney is limited to one portion of that kidney and the functional speed of its more distant portions are not greatly affected by it. Under such conditions it, at times, occurs that the appearance time is not greatly increased and, upon rare occasions, it is even decreased. One has only to observe a tuberculous or a calculous kidney excrete its indigocarmine a few moments before its well fellow, to have his confidence shaken in the accuracy of a diagnostic method of determining functional capacity based upon minor differences in appearance time. On the other hand, the rarity of such an occurrence, the fact that the appearance of this dye is usually markedly retarded in the presence of even moderately advanced surgical kidney disease, the further fact that the test can be carried out without catheterization of the ureters, and that it can be done in far less time than can its more admired rival, give it very definite points of value in many cases. From the standpoint of convenience, it is attractive to the busy cystoscopist but, as kidneys are very valuable organs, it is questionable if this fact is germane to the issue.

Aside from the consideration of appearance time, there looms the question: Just how accurate is one's color memory as he turns his cystoscope from one ureteral orifice to the other in order to judge the density of the emitted jet of dye-colored urine? In this regard, the personal factor must of necessity play an enormous part, and one who has tried to teach the art of cystoscopy to any great number of individuals cannot hold the opinion that great accuracy in either color perception or color memory is a common human attribute. Also, indigocarmine is colorless in highly alkaline urines. Such being the case, it unquestionably is true that the test that lends itself most readily to a quantitative determination wherein the human factor is reduced to a minimum is by far the safest for the patient and brushes aside the mere question of convenience.

One, however, should not conclude that, though the phthalein test lends itself to more ready quantitative determination, it must of necessity render the indigocarmine test useless. The latter has many very definite points of usefulness, provided that its faults and limitations constantly are borne in mind. Like the phthalein test, it must be considered as only a part of the diagnostic picture and, often, it must be viewed only as an indication for further study wherein greater accuracy may attend.

While it is the rule in general medical practice to give these dyes by intramuscular injection, it has become the cystoscopist's custom to employ the intravenous method of administration. This shortens the appearance time and increases the rate of excretion, both points of particular value to the cystoscopist. For he can base his opinion upon fifteen- and thirty-minute periods, rather than upon the one- and two-hour periods of the intramuscular method.

*Technic of the Differential Indigocarmine Test.*—In the performance of this test 6 c.c. of a 0.8 per cent sterile indigocarmine solution is injected into the vein and a close watch is kept upon the ureteral orifices to determine just how soon the dye appears in the emitted jet of urine from each ureter. The average appearance time of the dye is from two to eight minutes from the normal kidney. The dye at first appears as a pale blue jet

from the ureteral orifice which in the presence of a properly functioning kidney changes to a much denser color very quickly usually well within a minute. This degree of density should be the same on both sides and a safer opinion of this density of color is to be had if catheters are passed a short way into each ureter and the urines collected in test tubes for comparison. In so doing one should consider density of color and not quantity of urine as leakage past catheters thus placed is of common occurrence.

This test is of value in cases where for one reason or another ureteral catheterization is unwise or impossible and one usually is safe in concluding that very marked retardations in appearance time and marked differences in concentration of the dye are due to disease of the corresponding kidney. The greater doubt rests with the lesser degrees of difference so commonly seen in cases presenting less advanced kidney lesions.

The intravenous injection of indigocarmine often is a valuable aid in locating those ureteral orifices which because of edema or other bladder change are not visible.

*The Technic of the Intravenous Differential Phthalein Test*—As phenol sulfonphthalein is colorless in all but the rare extremely alkaline urines it is necessary to carry out ureteral catheterization for its performance. And as the possibilities for error are very real it is wise to exercise certain technical precautions if such errors are to be avoided. Some years ago the writer carried out a number of such tests by passing number 6 catheters into both ureters in order to determine just how much reliance could be placed upon the double catheterization method. Years later Dr F S Schofield repeated these tests with the same results. He found that in at least 75 per cent of the cases urine leaked along the side of one or both catheters and that at the end of the test period these cases had from 2 to 15 per cent of phthalein in the bladder. There was no way in which one could determine on which side the leakage occurred. From these tests it was obvious that one could not rely upon his results unless they were proved by a test of the fluid obtained from the bladder that leakage had not occurred. And as some leakage occurred in at least three fourths of the cases it was easy to see that the double catheter method was not of such great value as was supposed. That it is the method generally used is to be deplored.

As the result of his earlier investigation it was apparent to the writer that one could rely only upon a test wherein the ureter was so occluded by the catheter that leakage did not occur. Consequently for years it has been his custom to pass the rapering (Garceau) catheter into one ureter until it occluded the ureteral orifice and to collect the urine from the other kidney transvesically. In doing this he by preference passed the catheter into the ureter of the supposedly well kidney. Theoretically this may be open to question but practically no harm has followed it. The catheter does not enter the kidney pelvis and there also is a very grave question regarding the possibility of ascending infection under such circumstances. The one great argument for catheterizing the well side is that both the patient and the surgeon are more vitally interested in the well side than in the diseased side so far as after life is concerned. One knows that urine coming through the catheter comes from that kidney and a normal phthalein

output with a normal urine upon the supposedly well side gives untold comfort to all parties concerned.

Because the possibility of causing temporary ureteral occlusion by catheter trauma is a very real one, the ureter upon the supposedly diseased side is not touched until the end of the test. The bladder then is emptied into a beaker through the cystoscope, after which, the catheter is withdrawn from the ureter and passed for a short distance into the other ureter in order to obtain some of its urine for microscopic study. The first few cubic centimeters of urine should be discarded, as it may contain cellular elements from the bladder or the other side.

Even with these precautions, it, upon rare occasions, happens that doubts arise regarding the results obtained. In such a case, it is best to repeat the study at a later date by passing the catheter this time into the other ureter and to collect the test urine from the supposedly well kidney transvesically.

In this test one does not concern himself nearly so much with appearance time as he does with quantity output, though appearance is rather easy to obtain. In order to judge of the appearance time from the transvesically obtained urine one should have the bladder empty and, from time to time, allow a very small quantity of his irrigating fluid to flow into the bladder and to return through the cystoscope for testing.

One cubic centimeter of a 0.6 per cent solution of phthalein is injected intravenously and the appearance time is the same as that of indigocarmine, that is, from two to eight minutes from the normal kidney. The normal output is about 30 per cent from each kidney in thirty minutes. Care should be taken not to base too much value upon fifteen-minute readings, as it not infrequently happens that the presence of the catheter in the ureter slows the rate of output for some minutes, so that the reading of the first fifteen minutes is apparently subnormal, but it is brought up to the normal half-hour output in the second half of the test period.

The urine is allowed to drop into either a 25 per cent sodium hydroxide solution or a saturated solution of sodium bicarbonate. The latter is preferred by many because of its harmlessness. The presence of even a small amount of phthalein is demonstrated by the immediate change to a red color as the urine meets the alkaline solution. The quantity is determined as has been described in a previous section. If sodium bicarbonate has been used for the determination of the appearance time, it is well to add some sodium hydroxide for the quantitative estimation in order to insure greater alkalinity.

**Separate Kidney Urines.**—If urines from the separate kidneys are to be sent to the laboratory for study instead of being studied immediately by the cystoscopist, great care should be taken to see that the laboratory worker knows just what studies are required. Laboratory workers are inclined to think that specimens sent in test tubes closed by cotton plugs are for culture purposes alone. Error usually will be avoided if the specimen is accompanied by a slip of paper asking for the studies desired, which usually should be for cellular content, bacteria present, and, perhaps, comparative urea contents and specific gravities. If all of these are needed there should be at least 20 c.c. of urine in each tube. If one is interested

merely in the cellular and bacterial content much smaller quantities will do

The urologist who must rely upon laboratory reports does well to make sure that the small epithelial cells scraped from the mucous membrane by his catheter are not interpreted as pus cells. As has been pointed out in the first section of the book they are the same size and, unless the microscopist is aware of their constant presence and close resemblance, he is sure to render a report of pus cells. Upon a number of occasions the writer has split samples of urine examining one part himself and sending the other to the laboratory for a report on cell content. The experiences thus obtained have shown that false pyuria reports are far too common to make it safe to trust those of laboratory workers not made aware of this almost constant confusing element. It is perhaps due to the famed perversity of animate things that such misleading results seem far more common where cystoscopies have been most difficult.

The delay in such studies occasionally allows of changes in the urine that may cause the overlooking of an abnormal number of red blood-cells.



Fig 350 Fulguration of a vesical papilloma (Pfecher)

For as has been said elsewhere these cells become swollen and ruptured in urines of very low specific gravity or shrunken and almost unrecognizable in urines of high specific gravity. The importance of this is relative however for one usually disregards small numbers of erythrocytes in catheterized kidney urines on the assumption that they are due to catheter trauma.

**Cystoscopic Fulguration**—Introduced in 1910 by Edwin Beer this means by which benign tumors of the bladder can be destroyed fulguration has become one of the cystoscopist's most valuable therapeutic measures. Beer first used the monopolar (Oudin) current. This current was so difficult to control and had such a tendency to leak through the small insulated wires then used and to burn the insulation that it soon became common custom to employ the bipolar high frequency current (d'Arsonval). Now the Oudin current is very rarely used for this purpose. The bipolar current is far more easily controlled and rarely burns through the insulation of the intravesical electrode.

In order to carry out fulguration by this current a broad electrode

must be placed upon the surface of the body. This electrode should have a surface of 24 square inches or more, and should be in close contact with the skin surface if annoying sparking from it to the skin is to be avoided. For this purpose, some use a copper plate covered with muslin or some such material. The latter should be kept wet with salt solution, since if it is allowed to become dry, skin sparking will occur which may cause true surface burns. Others use heavy lead foil without a covering and without moistening with salt solution. It is a wise plan to place such a sheet of foil on a heavy sheet of rubber to prevent current from escaping to the table. Otherwise, if much current is being used the patient may be sparked wherever he touches the metal of the table. It is most convenient to place this indifferent electrode under the patient's sacral region and it is wise to instruct him to lie firmly upon it.

One wire is attached to this pad and the other to the intravesical electrode. The writer prefers an electrode such as that of Timberlake. This particular electrode has the wire projecting through a small ivory tip and, to remove charred tissue from it, one need not remove the lens system but can pull the wire into the insulated channel and then push its end out again.

As elsewhere has been said, great care should be taken to have the lighting current come from a battery source. Otherwise, the patient is very badly shocked when the fulgurating current, which is attached to the house current, is turned on.

It is well to turn the current into the electrode in the bladder at a low point and gradually increase it as need be. In this way the sensitive patient experiences much less discomfort and is far more easily controlled if the treatment must be a prolonged one. Before applying the current, the wire should be brought into direct contact with the surface to be destroyed and it should be turned off again when it is intended to withdraw the wire from the surface.

As the current is turned on it will be noticed that the tissue is blanched and a number of small bubbles arise from the area being treated. If the cystoscope fenestration is held directly over the treated area these bubbles collect in it and obscure vision. For this reason, it is best to hold the instrument so that one looks diagonally at the surface. In this way the bubbles rise quickly to the bladder apex and cause no blurring of vision. Should the bubbles collect in the fenestration, they can be removed quickly by turning it upward and allowing the dilating fluid to flow for a moment. If this does not cause them to leave the lens, the lens system should be withdrawn a short distance and tapped lightly.

In carrying out such fulguration care should be taken to see that the bladder is well dilated, as it makes for far safer and easier work. The wire should be plunged in various directions, taking care not to burn the bladder wall.

It is a mistake to make such treatments too prolonged or to do them at too close periods of time. Unless there is an enormous amount of growth to be removed, it frequently is well to space treatments at two- or three-week intervals. At the second of such spaced treatments one usually is surprised to see how much more growth was destroyed at the preceding treatment than was supposed. For some reason, patients given treatments at shorter intervals often develop an attack of acute cystitis. This rarely



occurs in those allowed to go a longer time between treatments. This and other things regarding fulguration have been elaborated upon further under the heading of Benign Papilloma.

### ROENTGENOGRAPHY

Beyond a doubt with the exception of the cystoscope, roentgenography has proved to be the greatest addition to the urologist's diagnostic possibilities. It has brought down his margin of diagnostic error to quite an attractive minimum in that great group of surgical diseases of the urogenital tract, at the same time making it possible to discover many things in which surgery may not be advisable. Pyelography, either intravenous or retrograde pyelo ureterography, cystography urethrography, and the plain roentgenogram have taught us more about the physiology, symptomatology, pathology, and abnormalities of the urogenital tract than our forefathers ever dreamed. They have revolutionized the entire art of urologic diagnosis.

So striking are the things they so often reveal, that there has developed a far too general tendency to resort to them and to trust them almost to the exclusion of other studies. No sooner do some workers suspect urogenital tract pathology than they advise and resort to such studies despite the fact that a urographic study, usually, is only a part of such studies and, often, a highly misleading part. There are many things that should be determined as a rule before the patient is even ready for such study. And not uncommonly, the correct diagnosis depends upon these things more than it does upon the roentgenologic findings. These latter, just as often as not, give merely confirmative data or data that mislead through faulty interpretation.

As previously has been pointed out there are great possibilities for faulty interpretation in all of these roentgenographic demonstrations. These faults are often overcome by the most careful preliminary studies. The safe interpretation of roentgenograms requires a great familiarity with all of the factors involved and faulty conclusions are common under even the best of circumstances. Comparatively few urologists, and just as few roentgenologists, develop the art to such a high state of perfection as to warrant the dogmatic opinions that so commonly are voiced. So true is this as to give the greatest value to a mutual study of such films rather than to rely upon readings by either alone. True in the highly characteristic shadowgraphs this may not be so essential, but in that far greater number where the shadows are not so characteristic, this cooperation is of the greatest value if unfortunate errors are to be avoided.

That there are great possibilities for the faulty interpretation of pyelographic films is shown by a study of the shadow outlines taken from the works of several authors, as shown in figures 99 and 353. From a study of these it is obvious that the kidney pelvis shadows in both health and disease are not always so uniform and characteristic as might be supposed. And one readily can sense that not only is there an extremely wide zone of the perfectly normal but it rather commonly encroaches upon some of the near rules that have been laid down from time to time in our descriptions of the pathologic pelvis. Of course there are many pelvic and renal

changes that give unmistakable roentgenograms, ones that almost could stand alone as diagnostic demonstrations. More often, however, these are found in advanced pathologic processes in which diagnosis rather commonly has already been made and the roentgenogram is merely confirmatory. The aim of urologic diagnosis is the discovery of pathologic processes before they have reached points of great destruction. And it is in this large group of cases that one must tread carefully lest he be swayed into the doing of ill-advised surgery by pyelograms that, because of under- or overfilling of the kidney pelvis, or other faults or misfortunes of technic, give findings that are none too safe to follow.

As cystography and urethrography have been considered elsewhere and do not, in reality, belong in a section devoted solely to cystoscopy, the present section will be confined to a consideration of upper tract urography. Though intravenous urography, also, has been discussed briefly elsewhere, its shadow interpretations blend so intimately with those of the truly cystoscopic retrograde methods as to give little point to their separation in a consideration of pyelo-ureterography. Hence, they will be elaborated upon further in the present chapter.

**Indications for Pyelography.**—The indications for pyelography differ with different workers. To those with unlimited x-ray facilities it is almost a routine procedure unless marked contraindications to it present themselves. To others not so fortunately situated many things must be taken into consideration, not the least being the patient's ability to stand the financial burden. That this burden is not inconsiderable is outstanding. The cost of the equipment, material, and upkeep of a properly selected x-ray unit, even if one views it as other than a source of medical revenue, is considerable when apportioned to each individual case.

While it is probable that the routine use of some type of roentgenologic study would reveal pathology that otherwise might escape detection, it, also, is true that most of those interested in urology cannot avail themselves so freely of its help. Thus, they are forced to a selection of those cases that really need such studies as against those in whom a correct diagnosis can be made without them.

Broadly, it may be said that pyelography is indicated in all cases wherein diagnostic doubts exist after all other studies have been carried out unless there are definite contraindications to it. Just how many this is will depend upon how well one can carry out the needed studies and how well he can interpret their accumulated findings. If he has fitted himself to do these things in a safe, commonsense way, he will feel less need for pyelographic studies. If, on the other hand, he has allowed his leanings to carry him toward seeming short-cuts, he is likely to feel that most cases require such studies. Also, he is likely to slight the other data that so often prevent error in the interpretation of the films he has obtained. In these statements of view there is no desire to belittle the immense value of pyelograms but to bring to the matter a sense of proper proportion that so easily is lost, to the detriment of many patients. In every urologic study an effort should be made to plan the proper sequence as well as the need for the various procedures. And, if this is carefully done and followed, there will be little doubt about the advisability of and need for pyelography.

**Intravenous Pyelography.**—The simplicity and the seeming harmless-

ness of intravenous urography have done much to encourage its use where catheter pyelography has more to offer. While it has many definite advantages over the latter, the films are not usually so positive in their demonstrations and film readings frequently are not nearly so reliable. Particularly is this so in the study of the major and minor calices. The shadows occasioned thereby are dependent upon the amount of solution excreted by the given kidney and the amount that can be caused to remain in the kidney pelvis and ureter during x ray exposure. Thus, a blocked ureter, a poorly functioning kidney, an abnormally large ureter with good emptying possibilities, and many other factors may eliminate the possibility of obtaining any shadow on the diseased side, whereas, that of the other side may give excellent delineation. Unless a low ureteral narrowing or abdominal pressure causes the retention of the opaque solution in the ureter, there is much danger of viewing as normal the vague shadows which at times are seen in the presence of marked ureteral and pelvic pathology. Hence, through thoroughly uncontrollable factors, one of the most valuable of diagnostic procedures often carries with it enormous potentialities for faulty interpretation.

In those cases where the kidney pelvis and ureter are clearly outlined the method is invaluable. But it, even then, requires a better type of accessory study than does catheter pyelography. That it lends itself so readily to use in those patients in whom catheter pyelography is highly contraindicated adds much to its usefulness. In children, during pregnancy, in conditions associated with acute lower tract pathology, and in the aged where catheters cannot be passed or cystoscopy should not be done for one reason or another, it finds its place of greatest value.

It early was thought that the method could be used as an indication of the functional capacity of the kidneys but experience has shown this to be of very limited value in many cases. In this regard it has its greatest value where it is least needed. If the shadows show good excretion one can say that the kidneys are functioning but he does not do well to say a kidney is not a functioning one just because at the time of study no opaque solution appeared on that side, as there are numerous conditions other than failure to excrete that may prevent its presence or accumulation in the pelvis or ureter of enough opacity for a good roentgenogram. In so many cases the possibilities for error are so great that he who relies upon such excretion as an evidence of true lack of renal function is courting much chagrin. (See Fig 98.)

**Contraindications to Intravenous Urography**—The casting of a readable shadow being entirely dependent upon the kidney's ability to excrete the solution naturally makes intravenous urography useless or nearly so in all cases where renal excretion is at a low ebb. Thus, in the presence of anuria, uremia, and even marked oliguria it offers little of value and may do harm. All of the solutions being iodine compounds, they should not be used where any idiosyncrasy to that substance exists. They also are contraindicated in hyperthyroidism, marked renal disease, acute pyelonephritis, and active pulmonary tuberculosis. Pregnancy rather generally has been considered to contraindicate the injection of iodine compounds, but Schumacher, as cited by Lower and Nichols, has, without observable harm, carried out intravenous urography on a hundred pregnant women.

**Technic of Intravenous Urography.**—In the performance of intravenous urography the pyelographic medium, usually either uroselectan, iopax, neoiopax, skioldan, or some other such preparation is injected into the vein and exposures are made at different intervals thereafter. The general custom is to make one within the first ten minutes after injection and several others at fifteen-minute intervals thereafter. Usually, an air cushion is belted over the abdomen to create pressure at the pelvic brim as well as push the colon toward the sides. Better filling effects are obtained, particularly in those with dilated ureters and kidney pelves, by placing the patient in an exaggerated Trendelenburg position. Also, it may be wise to place the patient in different positions during exposure, if necessity suggests.

**Retrograde Pyelography.**—The advantages of retrograde or catheter pyelography over those of the intravenous method have been mentioned. And, despite its many drawbacks, it is largely the method of choice by most urologists of experience in patients where it can be done. The data obtainable by it usually is of a much more reliable nature. The pelvic and ureteral shadows are far sharper and there is much more likelihood of one's being able to reveal minor changes than is the case with the intravenous method. It, however, is followed by many more reactions and is no office procedure unless the office is so equipped that patients may be cared for for a few or, perhaps, a number of hours thereafter. To do retrograde pyelographies and immediately send patients home is to run risks of varying gravity. One does not do well to assume that such postpyelographic reactions are due alone to traumatic cystoscopy and catheterization, as some say. For such is definitely not always the case. Reactions, at times, follow efforts of the most gentle nature and in cases wherein no immediate difficulties are encountered. By this it is not to be understood that such reactions are exceedingly common but that they, at times, are of a decidedly severe nature. They may occur after the most gently and easily done catheterization wherein no fluid was injected into the kidney pelvis, and they are much more common where such fluids have been injected. No matter how carefully a catheter is passed into a ureter it usually draws blood in minute quantities and such blood means injury to the ureteral mucous membranes. Some ureteral and vesical mucous membranes build up edema on the slightest amount of trauma, while others seem to be able to stand almost anything without the appearance of edematous swelling. And it takes very little edema to block a ureteral lumen for some hours. Ureteral block in the absence of infection may mean a few painful hours for the patient. In the presence of infection it commonly may be an extremely dangerous matter.

It is perfectly true that most of these reactions can be prevented by the utmost gentleness of manipulation and the most scrupulous care as to technic. However, one never knows just what will be encountered and it is unfair to the patient and none too good for the art to run risks of having the patient experience any type of reaction after he has returned to his home.

Many of the most severe reactions are due to the use of too much force in the introduction of the pyelographic medium by injecting it with a syringe. No matter how skilled one may be, he can have no real concep-

tion of the amount of intrapelvic pressure he is causing in this way Wesson and Ruggles have pointed out the well known fact that capillary blood pressure is rather low, ranging from 20 to 55 mm of mercury and that when the intrapelvic pressure reaches 60 mm of mercury the secretion of urine ceases and filtration reverses itself so that the pelvic fluids enter the bloodstream They further state that The advocates of the syringe are positive that they can control the amount of pressure, but by attaching

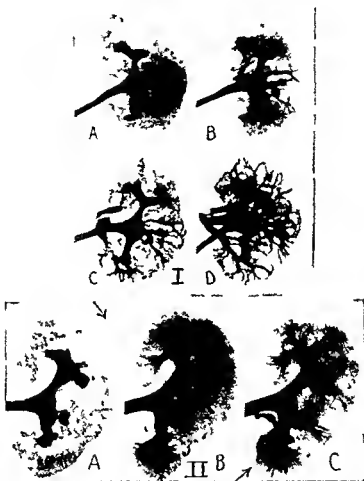


Fig 351.—I Pyelovenous backflow of human kidney (A) With back pressure of 0 mm of mercury (B) with 25 mm (C) with 30 mm (D) continuation of 30 mm II Tubular back flow (A) Normal pyelogram (B) 100 mm of pressure (C) 120 mm of pressure (Lee Brown and Laidley From Hinman, Principles and Practice of Urology W B Saunders Co., Philadelphia)

a manometer it is surprising to find how little force is necessary to register 100 to 250 mm on the gauge Such being the case it is obvious that one plays far more safely if he uses only the gravity method for the introduction of fluid for pyelographic purposes

In using the gravity method, things should be arranged so that the top of the column of fluid in the buret is never more than 18 inches above the kidney level If the kidney level is lowered by placing the patient in the

Trendelenburg position, the buret likewise should be lowered if dangerous pressures are to be avoided.

**Technic of Retrograde Pyelography.**—Having prepared the patient for roentgenography, the use of an opiate prior to pyelography may or may not be deemed necessary. Usually it is better to have a patient whose pain sense has not been dulled if one would judge as to whether or not he has distended the kidney pelvis. For it is the patient who must answer the question, and a dulled pain sense may lead to pelvic overdistention. Most cystoscopists do not use any opiate, but it is possible that the highly nervous patient may be more tolerant and cooperative if one is administered.

The patient should be placed upon the table in such a position as gives comfort and allows of a maximum of relaxation. The catheter should be passed slowly and gently up the ureter into the kidney pelvis in such a way as not to be in an upper calix. This easily can be prevented in most patients by determining the point where the rhythmic dripping of the urine due to ureteral peristalsis ceases and the steady drip of pelvic urine begins. Often it is well to withdraw the catheter a few centimeters to check on the exactness of its location. It should then be advanced very slowly until the peristaltic ureteral force ceases, after which it should be passed not more than 2 or 3 cm. further. If this is done the catheter tip will lie in about the middle of the average pelvis.

Good pyelographic films depend upon a moderate amount of pelvic distention. Unless certain precautions are carried out, filling the pelvis is rather a blind procedure, for the return of fluid alongside the catheter is by no means rare. And it is almost impossible to see it coming from the ureteral orifice, as practically all of the solutions used are colorless. This difficulty rather easily can be overcome by an intravenous injection of indigocarmine, though this seldom is done. Under such circumstances, however, one knows if his fluid is returning and he can place his patient in an exaggerated Trendelenburg position in an effort to overcome this fluid return.

The fluid is allowed to enter the kidney pelvis very slowly, until the patient has a slight feeling of fullness in the renal region, when the exposures are made. It is not wise to wait until the patient is in real pain. Real pain generally means pelvic overdistention and patients who have it more commonly have after-reactions than do those by whom only a slight sense of fullness or soreness is felt.

It is well to take several exposures from different angles or take stereoscopic exposures. And it is wise to take a later exposure with the patient in the upright position in order to demonstrate the location of the kidney in that position as well as to determine the emptying possibilities of the renal pelvis.

Added information as to the function of the kidney pelvis and ureters can be gained by the taking of serial exposures. This method has been used extensively by Moore and has shown that what previously was considered ureteral pathology was due solely to the film having been taken at a certain phase of the contractive cycle. It, also, has demonstrated that many things that were considered to be definite kinks in the upper ureter were due to the particular phase at which the film registered normal renal mobility.



ENR

Fig 352—Outlines of the kidney pelvis in the presence of renal tumor as shown by pyelographic studies by several workers.



NORMAL  
P. SON  
R. O. C.



NORMA  
E



H. DEONER  
O. A. R.  
R. O. C.



NORMA  
E  
P. SON  
R. O. C.



ADENOCARCINOMA  
E. B.



RENAL TUMOR  
P. SON  
R. O. C.



RENAL TUMOR  
P. SON  
R. O. C.



RENAL TUMOR  
P. SON  
R. O. C.



RENAL TUMOR  
P. SON  
R. O. C.



RENAL TUMOR  
P. SON  
R. O. C.



RENAL TUMOR  
P. SON  
R. O. C.



RENAL TUMOR  
P. SON  
R. O. C.

Fig 353—Blocked outlines from pyelographic studies by different authors. Comparison of these outlines reveals the great possibilities for confusion that rest in roentgenograms alone.

Most urologists frown upon the doing of pyelographic studies upon both sides at once, though there are those of wide experience, notably Wesson, who routinely do bilateral pyelographs. Following several distressing experiences the writer long since abandoned the practice.

After the kidney pelves have been dilated and exposures made, it is good practice to draw the catheter far down into the ureter and allow the pyelographic fluid to run while exposures are being made, in order to demonstrate the size and contour of the ureter. Better ureteral shadows are gotten as a rule if the patient is changed to a virtual sitting posture as the effort is made to fill the ureter. This often, however, is not successful and many workers use some type of occluding catheter for this purpose.



Fig. 354.—Complete bilateral reduplication of the ureters and kidney pelves. (Department of Roentgenology, University of Pennsylvania.)

If there is the slightest reason to suspect ureteral obstruction of any kind, the catheter should be reinserted to the kidney pelvis and left there if distressing after-symptoms are to be avoided. Because of this possibility, in any case it is wise to employ a pyelographic solution containing a germicide, such as 1:3000 mercuric iodide. Comparatively few catheters reach the kidney pelvis without carrying a few bacteria with them and one always is safer with a bactericidal medium. In the presence of known infection the indwelling catheter and the bactericide are of equally great value. A combination of both of these years ago would have been the means of avoiding emergency operations on two of the writer's patients, one of which proved fatal.

The most common and, perhaps, the least irritating solution used is one composed of from 12 to 14 per cent sodium iodide in distilled water. To



this can be added 1 gram of mercuric iodide to 3000 c c of solution Sodium bromide and thorium nitrate solutions are far more irritating than is sodium iodide Thorium nitrate is not only expensive but is highly toxic if through misfortune it enters the blood stream

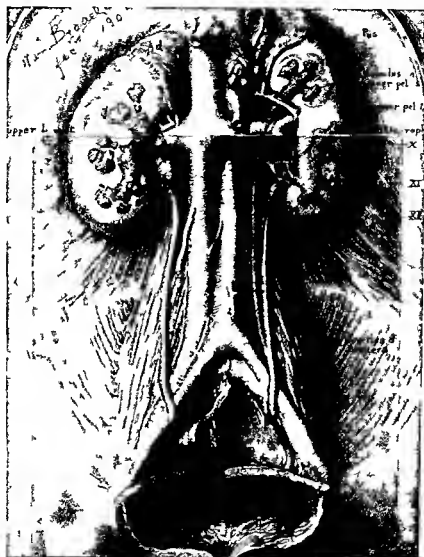


Fig 355 Bilateral renal calculi This most excellent drawing by Brodel shows a not uncommon error due to placing the x ray film too low to cover the entire kidney The upper stones in the single kidney were missed as were those in the upper calyx of the double kidney (Young's Practice of Urology W B Saunders Co Philadelphia)

**The Interpretation of Pyelograms.**—Before trying to interpret pyelographic films it is absolutely necessary that one become thoroughly familiar with that extremely wide range of contours that have been shown to be within possible normal Without such a familiarity he is in an extremely poor position for the exhibition of worthwhile film readings Not only

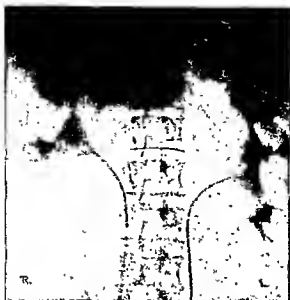


Fig. 356.—The elongated, spider form of renal pelvises so commonly seen in polycystic disease of the kidney. (Herman, *The Practice of Urology*, W. B. Saunders Co., Philadelphia.)



Fig. 357.—Bilateral pyelograms showing the common contour of the pelvic shadows in the presence of horseshoe kidney. Not only are the pelvic shadows lower than normal but the calices of one kidney are turned inwards. At times, both pelvises are turned in this direction. (Herman, *The Practice of Urology*, W. B. Saunders Co., Philadelphia.)

must he know these normal variations in the outlines of the minor and major calices, pelvis and ureter but he must be familiar with the changes that faulty renal position may make in the perfectly normal pelvis. And, while



Fig 358—Hydronephrosis with pelvic calculi as the result of an aberrant renal artery  
(Department of Roentgenology University of Pennsylvania)



Fig 359—Renal ptosis with slight ureteral dilatation probably due to faulty position of both kidney and ureter (Department of Roentgenology, University of Pennsylvania)

he looks for the characteristic cupping of the minor calices, he must realize that only those caught in profile appear cupped. The others are round or elliptical areas of greater density because they are not in profile. They, therefore, are shadows of deeper columns of medium and, often, are of such density as to suggest calculus. Such possibilities for erroneous interpretation frequently give value to films taken at different angles.

The normal position of the kidney pelvis, together with its possible normal changes in position as the result of inspiration or, at times, posture, are of the utmost importance. Here one also has to sense a rather wide range of changes that may be considered within normal limits for the given individual. In thin individuals and in women, this renal excursion often is so great as to give the idea of ureteral kink, particularly on the right side.

Normally, the right kidney is 2 or 3 cm. lower than the left and their pyelographic shadows should have the same relation to one another. This relation, however, may not always hold in the presence of pelvic reduplication, as both sides are not always the same size. One often extends further toward the diaphragm than its fellow.

The normal kidney pelvis is irregularly funnel-shaped, sloping gradually, though occasionally rather sharply, to the ureteropelvic junction. This point usually lies on the line of the middle of the transverse processes of the vertebrae and the ureter descends almost perpendicularly along this line. Catheters pushed too far into the renal pelvis often throw the ureter away from this line and, at times, push the kidney slightly laterally, giving the impression of faulty renal and ureteral location.

Between the brim of the bony pelvis and the point where it enters the bladder, the ureter makes a definite curve with its convexity outward.

To describe even a small number of the possible departures from what we call normal in these structures, would require volumes. This has been done so well by others that it will not be attempted here. The accompanying urograms from various sources will do much to show the utility of the procedure as well as the enormity of the subject.

**The Influence of Pregnancy Upon the Ureters and Kidney Pelves.**—A great amount of study has been carried out upon the change of the conducting structures of the upper urinary tract as the result of pregnancy. Perhaps, one of the most comprehensive studies along this line, is that of Schumacher. His work is of so enlightening a character that it will be of considerable value to quote it as it appears in the work of Lower and Nichols.<sup>1</sup>

- "1. Our knowledge of the changes in the ureters caused by pregnancy thus far has been based upon more or less nonphysiological methods of examination, and, therefore, the results are not very reliable.
- "2. Intravenous pyelography with uroselectan, on the other hand, permits the obtaining of a true picture of the normal and pathological ureters, and is, therefore, of great value.
- "3. These examinations of 100 pregnant women were made by means of the stereoscopic method with the following results:
- "4. The ureters were normal in the first four months of the pregnancy.

<sup>1</sup> Roentgenographic Studies of the Urinary System, C. V. Mosby Co., St. Louis.



Fig. 360.—Pyelography of a pyonephrotic kidney with escape of some of the pyelographic medium into perinephric cavities. (Department of Roentgenology, University of Pennsylvania.)



Fig. 361.—Obstruction at the ureteropelvic junction by an aberrant renal artery. (Department of Roentgenology, University of Pennsylvania.)

- "5. In the fifth and sixth months the lower section of the abdominal ureter is displaced by the gravid uterus in 50 per cent of the cases, and in the seventh and eighth in over 80 per cent of the cases.
- "6. The pelvic ureter is only slightly displaced by the growing uterus.
- "7. Besides the displacement of the abdominal ureter toward one side and toward the back, one can see that, even in early pregnancy, the abdominal ureter is slightly enlarged and hypertonic.
- "8. Starting with the fifth month, this enlargement and decrease of tonus can be noticed in 100 per cent of the cases. It increases toward the end of pregnancy and affects both ureters in 83 per cent of the cases, on the left side alone in 15 per cent of the cases and on the right side alone in 2 per cent of the cases.
- "9. The abdominal ureter can be enlarged to a diameter of from two to two and one-half cm. This dilatation is found in primiparous and multiparous cases.
- "10. We found the pelvic ureter dilated in only two cases (congenital anomaly?). In extreme dilatation of the abdominal ureter, the pelvic ureter, on account of its hyperperistalsis shows only small, interrupted fillings.
- "11. Formation of kinks of the ureter directly below the kidney pelvis or at the boundary of the upper and middle third of the abdominal ureter is found in pregnancy in 80 per cent of all of the cases and usually is a consequence of stoppage.
- "12. The obstructive effect of this kink formation upon the renal flow upon the kidney pelvis is generally of small significance and can be recognized radiographically only in very marked kinking.
- "13. The cause of the dilatation of the ureters and the kidney pelvis is to be found in a compression of the hypertonic ureters. A compression of the ureters on the linea innominata can be observed very rarely—in 2 per cent of the cases.
- "14. The fact that the right ureter is dilated more frequently and to a higher degree than the left ureter is a consequence of the increased compression of the right ureter by the body of the uterus, which is inclined toward the right side.
- "15. The change of the position of the patient can, in some cases, relieve the obstruction.
- "16. The form of the pelvis and position of the fetus and small displacement of the pelvic ureter have no significance upon the compression.
- "17. The degree of the dilatation, however, shows a certain dependence upon the tonus of the uterus, since for a flabby uterus, compression is especially high.
- "18. In asthenia, compression of the uterus is very frequent, but extreme obstruction also occurs in healthy pregnant women.
- "19. The decreased tonus of the ureters in pregnancy can be recognized on the pyelogram and can be proved by artificial stoppage in pregnant and non-pregnant women."

## URETERAL CALCULUS

Under the above heading the clinical aspects of ureteral stone previously have been discussed and it is proposed here to consider the truly cystoscopic and roentgenologic phases of the condition. These naturally, fall under the headings of diagnosis and treatment. And as this is purely a nonsurgical treatise the question of treatment will be confined to those things that have to do with the methods of relief appropriate to patients not demanding true surgery.

Aside from the symptomatic aspects of ureteral stone which are not always of so characteristic a nature to insure safe diagnosis there are many diagnostic procedures which fall entirely within the domain of x ray and cystoscopy. This close alliance between these two branches is the greatest of boons to the urologist and it greatly has lowered his margin of error in the malady under discussion. Unfortunately for roentgenology however it finds definite limitations in this field of diagnosis by virtue of the fact that from 10 to 25 per cent of stones in the ureter are not of sufficient



Fig. 362. Petechiae of the ureteral ridge so characteristic of low density ureteral stone.

density to cast a discernible shadow. On the other hand there are extra ureteral shadows which unless one is extremely careful are likely to be mistaken for ureteral calculi. To some extent these may be eliminated by exposures with the patient in different positions or by stereoscopic x rays. The careful use of intravenous pyelography particularly with stereoscopic exposures often gives the roentgenologist an added means of eliminating extra ureteral shadows. Further by making an exposure after the intravenous solution no longer casts an ureteral shadow it occasionally may be found that an otherwise invisible stone has absorbed enough of the opaque solution to make it visible.

Despite all these procedures there are few things in which cystoscopic procedure holds greater value from both the diagnostic and treatment standpoints. By the use of the wax tipped catheter it usually is possible to prove the presence of those stones that have failed to cast an x ray shadow and by taking of roentgenograms with opaque catheters in the ureters it almost always is possible to rule out extra ureteral shadows. If the stone is in the lower 3 cm. of the ureter diagnosis usually can be made from the

appearance of the ureteral ridge and orifice alone. Often the cystoscopist can tell from the appearance of the ureteral orifice if a stone has been passed.

Even though the x-ray has established a diagnosis, one's work rarely is done, for the mere presence of a stone in the ureter raises questions that give untold value to cystoscopy. True, intravenous pyelography not only makes it possible to determine the question of complete ureteral block in many cases without the use of the cystoscope, but it gives as well a rough



Fig. 363.—Stone in the intramural portion of the ureter. (A) Swelling and edema of the ureteral ridge. (B) Cross-section showing stone in situ. (C) Fulguration over the position of the stone. (D) Stone seen through the fulgurated slit. (Pilcher.)

estimate of the comparative functional values of the separate kidneys. But even this has not reached such a high plane of perfection that it eliminates the need for cystoscopy. At times, it gives little data of great value to the patient or his physician.

Unquestionably, cystoscopy should be preceded by at least a "flat" x-ray plate in every case of suspected ureteral calculus if possible. Not only does it show the stone in a majority of cases, but it often puts the cystoscopist in a position to plan his methods of encouraging its removal and, thus, avoids the doing of many needless things.



In the discovery of the presence of stones not casting an x ray shadow and not lying in or near the intramural portion of the ureter where they may give characteristic changes to the ureteral area, most reliance can be placed upon the wax tipped catheter. This method had not received such general use as it deserved mainly because of its reputed technical disadvantages. These however, are not in any sense difficult to overcome. With proper care it is no great task to get the catheter into the ureter without cystoscopic scratches. Such a catheter may be passed into the bladder and threaded retrograde through the cystoscope sheath which then may be passed gently into the bladder, or the cystoscope may be passed and the catheter inserted through the sheath and threaded retrograde through the catheter channel of the lens system as it is inserted into the sheath. If this results in scratching on the way through the shaft there usually will be only a single smooth furrow.

In either event the wax tip should be brought closely into the visual field so that it may be examined under the lens system magnification before



Fig 364—Edema of the ureteral ridge with a stone protruding from the ureteral opening

it is introduced into the ureter. The straight McCarthy panendoscope makes scratching of the tip less likely than is the case with the convex or concave types of cystoscope.

Before anything is passed into the ureteral orifice it should be watched carefully to see if urine is emitted from it. This is of the utmost importance for the treatment of a stone that entirely blocks the ureteral lumen is a far more urgent matter than is that of a stone which does not interfere with the escape of urine. If doubt exists the intravenous injection of indigocarmine usually will solve the problem in a few moments, in the absence of marked kidney pathology.

**Treatment**—Comparatively few things require more judgment than does the management of ureteral stone. Into the picture come the questions of renal damage from back pressure, the presence of infection, the general condition of the patient, the size and position of the stone, of ureteral obstruction, the size of the ureter below the stone and a host of other things that must be evaluated if ill advised things are to be avoided. All of these things considered it often is by no means an easy matter to do just the right

thing, nor is it a simple matter to lay down fixed rules of procedure. There are, however, things that one should not do if he would avoid making the patient worse and perhaps precipitating him into a situation where operation, otherwise avoidable, becomes a life-saving necessity. Particularly is this true in the presence of complete block. Here one can lay down a rule that applies to most of such patients.

It should be remembered, as many times has been repeated, that no matter how careful may be one's cystoscopic technic, the cystoscope is passed through a canal almost impossible of complete sterilization and that it is probable that some bacteria are introduced into the bladder at every cystoscopy. In the absence of urinary stasis this is not a matter of any great importance, but if stasis is present the dangers of infection are enhanced enormously. To pass a catheter beyond a point of complete block and withdraw it is an excellent way to cause an infected hydronephrosis. The danger of this may be limited by injecting some 1:3000 neutral acriflavine or other antiseptic after the retained urine has been withdrawn, but even this is in no sense an absolute protection.

The same danger of infection exists to a lesser degree in passing a catheter beyond any ureteral stone, as the catheter trauma and the stone may cause a subsequent block for a period long enough for the development of infection. Having seen this occur in a number of cases, the writer is of the opinion that, if a catheter is introduced beyond the point of block it should be allowed to remain. If one withdraws it he may not be able to introduce it again, a fact that often is the case even where the stone does not totally occlude the ureteral lumen. Although it is a proper precaution in the absence of infection, the leaving of the catheter in the ureter is of even more importance if there is infection above the stone.

This does not of necessity mean that all such efforts are imperatively hospital procedures, for it is extremely rare for any harm to come to a patient returning to his home with a ureteral catheter in his ureter. Even in women this is possible if the catheter is passed 20 cm. or more into the ureter and its distal end securely strapped high on the inside of the thigh. However, if the obstruction is at the ureteropelvic junction there is great danger of its pulling too far down into the ureter if the patient walks. One of course plays much more safely if one hospitalizes the patient in whose ureter he has left a catheter. Under such circumstances, it is possible to watch matters more closely and to meet emergencies better if they arise, though they rarely do arise if the work has been done with a minimum of trauma and infection above the stone was not present prior to study.

Manipulations to the ureter between the stone and the bladder, even in the presence of complete block, are rarely liable to produce infection above. For this reason, one does not have the same hesitancy regarding them. In fact, it is a good procedure to endeavor to dilate these points of narrowing so that the stone may make a more rapid descent.

If one is attempting to remove a blocking stone with any of the so-called ureteral stone removers, he would do well to keep in mind the dangers of infection above the stone. And, should these efforts be followed by a rise in temperature lasting more than twelve hours, he immediately should insert an indwelling ureteral catheter. It is here that the patient ceases to be an office patient; his place is in bed.

Theoretically, such patients should make a prompt recovery upon the reestablishment of ureteral drainage. Practically, this favorable turn of affairs does not always take place. Instead of an infected hydronephrosis some few of these patients develop a true pyelonephritis and continue to exhibit a febrile reaction.

With the many excellent instruments and methods that are available for the removal of ureteral calculi it frequently is possible to hasten their delivery greatly. Their use is based upon either the direct removal of the stone or the encouragement of its descent. The former is in no sense an easy matter with stones above the ureterovesical junction. The possibilities of ureteral trauma are great and, often, it is far safer and more efficient to dilate the canal below the stone. This may be done with the Dourmashkin tunneled dilators, the Dourmashkin bag, the Bransford Lewis dilator, or the ureteral bougie or at times the Garceau catheter.

If the ureteral orifice is small, it may be necessary to dilate it greatly in order to introduce an instrument large enough to give sufficient ureteral



Fig. 365.—Stretching of the ureteral orifice by means of the Bransford Lewis ureteral dilator.

dilatation. There are those who recommend slitting the orifice either by fulguration or with the cystoscopic scissors. The writer is of the opinion that it is far better to dilate the orifice with bougies of graduated sizes until the Lewis dilator can be made to enter and greatly dilate the orifice.

It is stated that there is no danger in slitting the orifice by the above means. This in many cases is true, but a single exception will make one sorry he tried it. One of the few times the writer has done this was enough to make him place it among the list of things that may be done but are better avoided. That patient, a woman, experienced a ureteral reflux upon efforts to urinate and upon bodily exertion every time the bladder was full of urine. The pain of the pelvic distention thus occasioned was great. There were no means of cure and probably a urogram today would show a greatly distended pelvis and ureter, if not a much damaged kidney as the result of the intermittent back-pressure. At the time there was much reason to fear that the patient would seek comfort in medicolegal action.

One of the most valuable means of encouraging the descent of ureteral stones is that suggested originally by Crowell (Fig. 366), wherein several

very small catheters are passed alongside the stone, allowed to remain for perhaps twenty-four hours or more, and withdrawn very gradually. Bumpus twists the catheters ropewise before withdrawal and reports very good success with the method.

The writer has had no success whatever from the injection of either olive oil or cocaine into the ureter. With the Howard spiral wire "stone extractor" he has never been able to withdraw a stone. He has been able to break several small stones with it, however. It is an instrument with marked traumatizing possibilities and must be used with great care. Upon several occasions it has been removed from the ureter with such difficulty as to make him fear the need for surgical extraction. A much more useful

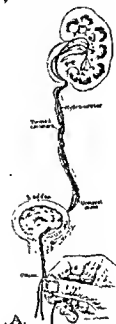


Fig. 366.—Outline demonstration of Bumpus' method of stone extraction from the ureter by the use of several small catheters which are twisted as they are withdrawn. Hinman warns that this method is not without danger and shows urograms revealing the passage of two of the catheters into the surrounding tissues. (Hinman, *Principles and Practice of Urology*, W. B. Saunders Co., Philadelphia.)

instrument is the Johnson stone-basket. (Fig. 367.) This really will bring small stones into the bladder in many cases. Occasionally, it will break the stones into small fragments that either come out with the instrument or are easily passed after the instrument is removed.

He who makes it the rule to shun haste and trauma in the presence of small, nonobstructing ureteral stones will have little to regret. If he remembers that the ureter, unaided, can deliver most of them, and applies proper judgment in the selection of those that must be attacked energetically and those that may be trusted to Time and Nature, he will save many kidneys that otherwise might be damaged irreparably. The fact that instruments have been devised is no reason for their use upon every case. It, of course, is well to keep under observation those patients entrusted to spon-

taneous delivery, and it is not a bad plan to have an x ray taken of them from time to time. If the stone is not increasing in size and is causing no symptoms it often may be allowed to remain for months. Frequently there is no return of a colic that could deliver it in that time but one almost may count upon such a seizure sooner or later.

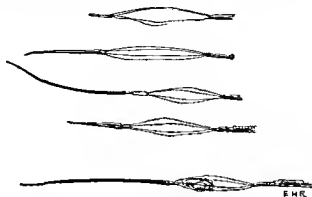


Fig 367 The several types of Johnson stone basket. In the lower one is a smaller calculus.

One should pursue such a waiting course only in the patient not having violent attacks of ureteral colic and in whom it has been shown that urine is coming from the ureteral orifice. If the stone in such individuals is above the pelvic brim and there is little discomfort such a course may be the better procedure in view of the fact that stones in the upper ureter usually



Fig 368



Fig 369

Fig 368—Fulguration of the ureteral ridge for enlargement of the orifice to release incarcerated stone.

Fig 369—Slitting the ureteral ridge to allow of the escape of a loosely lying stone.

are not so easily removed as are those in the lower. If the stone is in the lower ureter in such a patient it probably is better to make efforts to remove it rather than just to dilate the ureteral orifice and intramural ureter. It should be borne in mind that, if removal is not accomplished by this procedure the manipulations may cause complete ureteral block and change the entire clinical picture even to precipitating operation.

If the symptoms are severe and have lasted some time it is best to try removal efforts even though the ureter may not be blocked and even if the stone is in the upper tract. Such patients are frequently too sick to be office patients. They usually do better if several number 3 ureteral catheters are passed beyond the stone and allowed to remain in situ several days. To first try the stone-removing instruments on such patients may make it impossible to get small catheters past the stone if the efforts fail, as they so commonly do. The indication in complete block that cannot be relieved is emergency operation. Certainly such a condition should not be allowed to go for more than three days without surgical intervention if grave renal damage is to be prevented.

### STRICTURE OF THE URETER

The entire subject of ureteral stricture is in an extremely unsettled state among urologists. On the one hand, we find Hunner claiming to have encountered 2000 of them in eight years and, on the other, a large group of clinical urologists saying that they are almost nonexistent. Scarcely anyone has developed the degree of enthusiasm about them as has Hunner, who described them. Those who think the lesion a common one have been sorely put to it to find any great number of autopsy specimens to prove their point. In 479 autopsy specimens examined by five investigators not a single primary or congenital stricture was found and not more than six acquired narrowings were demonstrated. It is not uncommon to find valves or bands in the ureter at birth but these evidently disappear as age increases, as is shown by their entire absence at autopsy upon older individuals.

Much of the former roentgenologic evidence of the frequency of ureteral stricture has been discredited by the newer methods of serial urography. These have shown beyond a doubt that many of the narrowings formerly assumed to be due to ureteral stricture were merely ureteral peristaltic waves caught at a certain phase of the contractive cycle.

To say that every ureter that produces a "hang" to the acorn-shaped enlargement on bougies used for such diagnostic efforts has a stricture, is to lose sight of the resistance of normal ureteral narrowings, and of possible redundancy of the ureteral mucous membrane. With almost equal justice, one might say that the ureter that in any way impeded the passage of a ureteral catheter upward was the scar of stricture formation.

To urge that the reduction or disappearance of certain sensory disturbances following ureteral dilatation is proof that a stricture was present, is to ignore the fact that many patients develop psychogenic sensory symptoms in all parts of the body which nor infrequently are reduced or obliterated by almost any type of treatment that makes a profound psychic impression. Very few of us realize what a large percentage of human sensory complexes have their roots in mental fixations upon the various anatomic structures, or to what extent psychotherapy, whether it be vocal or instrumental, can obliterate these clinical syndromes.

It is the conviction of most careful urologists that one safely can dismiss the thought that ureteral stricture is of frequent occurrence. None of them, however, would go so far as to say that it does not occur. So far as congenital stricture is concerned there is no reason why it should be more

common than are congenital narrowings in other mucous channels such as the esophagus and the urethra. Most of us have encountered individuals whose ureters, particularly in the intramural portion would permit only of the passage of a number 3 catheter, individuals in whom there was little reason to suppose that the narrowing was other than a congenital one. More often, we have found ureters that were definitely narrowed as the secondary result of inflammation in contiguous organs or tissues.

Hence, one is on better ground if he admits the rare occurrence of both congenital and acquired narrowings. But he should not expect the wholehearted agreement of his fellows if he makes a diagnosis of the condition in every ureter that offers a 'hang' to his acorn bougie or in every patient experiencing an improvement in symptoms following ureteral dilatation.

Hunner claims that most ureteral strictures are due to some distant focus of infection, most commonly in the teeth or tonsils. If this is a direct cause it is an unusual pathologic process for conducting structures of this size. Also, considering that such focal infections are among the most common of human ailments there should be no trouble in frequently demonstrating ureteral stricture at autopsy. One who has followed closely the urogenital lesions and symptoms resulting from distant foci of infection is prone to suspect that in this regard, the need for a cause has conjured up a cause.

Be all of this as it may, the fact remains that some few individuals do have symptom producing ureteral narrowings and a far larger number, in the absence of urogenital pathology, have symptom complexes relieved or cured by ureteral dilatation. Some are as greatly benefited by urethral dilatation alone. And the careful urologist should keep these facts in mind whether or not he is able to demonstrate narrowings in either.

The clinical entity ureteroceles, occasioned by abnormal constriction of the ureteral orifice though by some included under the heading of ureteral stricture, is considered elsewhere. It is of comparatively rare occurrence and is dealt with by incision or fulguration rather than dilatation. It may produce back pressure effects upon the kidney pelvis and upper ureter. At times, a pin point ureteral meatus is the sole cause of upper tract dilatation.

In the presence of ureteral or kidney pelvis dilatation, as depicted by intravenous pyelography in the absence of stone in the ureter or of lower tract obstruction, ureteral stricture and abnormally small ureteral orifices should be ruled out. The writer has seen several such cases wherein renal surgery was advised and in which the dilatation was due to abnormally small ureteral orifices. Also, he has seen two cases with ureteral duplication and dilatation of the upper renal pelvis both of which were due to intramural narrowing of the ureter. In both it was possible to pass only a number 3 catheter with much difficulty, and in both the symptoms were cleared up by gradual dilatation.

**Treatment.**—If in the intramural portion of the ureter, the tapering catheter, followed by the Bransford Lewis dilator, offers the best means of treatment. Where such narrowings are higher up in the ureter the ureteral bougie designed by Braasch is perhaps, best.

## VESICAL HYPEREMIA

Hyperemia of the bladder mucous membrane may be the initial stage of acute cystitis or it may be due to irritating influences not sufficiently severe or prolonged to create a true inflammation. It may be confined to small areas or may involve the entire bladder wall. Most commonly it is due to chemical or instrumental trauma and, less commonly, to the ingestion of such things as methenamine in quantity while the urine is highly acid, cantharis, or other irritating medicaments. Varying grades of hyperemia may accompany pregnancy, uterine fibroids of size, uterine carcinoma, or even menstruation.

The cystoscopic appearance of hyperemia differs from that of true inflammation in that the smaller blood vessels usually remain visible and the mucosal surface does not lose its light-reflecting qualities. In the patchy hyperemias so commonly seen where cystoscopy is none too gently done, the smaller blood vessels become entirely lost in a bright-red hyperemic area and, unless one is particularly observant, such areas readily can be mistaken for true inflammatory patches. The difference, unless the trauma has been severe, usually can be determined in that those areas due to hyperemia from this cause become paler after a few moments, or almost disappear when the bladder is fully dilated, whereas, inflammatory areas undergo no such change.

Hyperemia of the trigone occurs toward the end of every cystoscopy, no matter how gently it is done. For this reason it is always wise to study the trigone at the beginning. Otherwise, one constantly is being misled into making a diagnosis of trigonitis where none really exists. In the presence of trigonal hyperemia due to instrumentation it commonly is impossible to see the blood vessels, as the entire surface changes to a bright-red color. If one is not careful to turn the fenestration of the cystoscope toward the side of the bladder when the obturator is withdrawn, it is not unusual to cause two parallel lines of hyperemia running from front to back. These correspond to the metal edges of the fenestration and could be mistaken for nothing else. (Fig. 283.)

In making a diagnosis of vesical hyperemia one should not be misled by the vesical condition described as "staphylococcic bladder." In this condition the smaller blood vessels are everywhere in evidence but there is a dusky, light-absorbing hue to the intervening membrane which, together with the ever-present flecks of phosphatic material, should prevent error. (See Figs. 417 and 418.)

## VESICAL INFLAMMATION

Cystoscopically, inflammation of the bladder presents a vast assortment of pictures. Not only do many different types of inflammatory reactions occur in different bladders, but it is a common experience to observe many of them in the same bladder. So varied are these reactions that they are difficult to describe and it has become the custom to classify them under a number of different headings. Such a classification has a clinical use, though the pathologic basis of many of these types of reaction is the same. In fact, there are few of them that, in themselves, are truly diagnostic of their causal factors. And, as a rule, one must consider the vesical pictures



seen merely as the influences of things to be determined by other than visual methods

Cystitis *per se*, is a condition of great rarity. Almost invariably the bladder mucous membrane is the victim and not the cause and one usually errs if he fails to search beyond the bladder for the reasons for its inflammation. Though the bladder is usually the victim, it occasionally is the case that the type and location of its inflammatory reaction is a reliable indication of the underlying cause. And it is in the interpretation of these things that cystoscopy reaches its highest level as an art.

As one's experience increases in the interpretation of the inflammatory reactions presented by the bladder to various influences he is likely to find himself classifying them as differing mainly by reason of the depth of the pathologic response. In those resulting from surface irritation wherein the submucosa is not involved he sees changes that are most evident in the circulatory distribution and in which swelling is not a factor. Early he sees a brush like accentuation of the minute terminal arterial branches a subsequent blurring of these minute vessels and a general mucosal reddening



Fig 300 Earliest visible stages of cystitis. Note the areas of redness at the extremities of the arterial trees.

of the intervening surfaces. (Fig 370) The circulation no longer is to be seen. This change may be only upon a limited area or it may involve the entire bladder wall. If the trigone is involved this general surface blush is more quickly established though through it blood vessels frequently may be seen more clearly than is the case with the general bladder wall. Should the condition persist for a long time without submucosal involvement, the mucous membrane takes on a more dusky hue and its blood vessels again become visible even to their smaller branchings but there still is no obvious mucosal swelling. At times the inflammation becomes patchy and takes on a slightly velvety appearance but marked evidence of swelling is still absent. This latter condition is more commonly seen in the female who has had gonorrhea and is more likely to be near the vesical outlet.

The presence of these types of inflammatory reaction particularly if they persist for some time is most likely due to the influence of the irritation resulting from nontuberculous forms of upper urinary tract infection. Particularly is this so in the absence of vesical outlet obstructions. And if the mucous membrane between the rather prominent circulatory trees is

of a dusky hue associated with the presence of small flakes of what looks like phosphate sand, one usually is safe in feeling that urine obtained from one or both ureters will show enormous clumps of staphylococci. (See Staphylococcic Cystitis.) Rarely does tuberculosis produce surface manifestations alone.

If, on the other hand, there is submucosal involvement the picture is entirely changed. Instead of the smooth mucosal surface, there appear either surface denudations of one type or another or the various types of edema. These denudations rarely impress one as true ulcerations, as he usually views ulcerations, but merely as superficial mucosal changes often backed by obvious deeper mucosal changes. They may be of limited extent or may involve the entire bladder wall. Usually, such areas are of a bright-red color and give the impression of violently active inflammation.

Edema may exist without marked change in the surface epithelium. If so, it usually is of the broad type and gives one the impression that the slightest break in the mucous membrane would result in the exudation of clear serum. Such edema more often is due to some type of submucosal interference with tissue-fluid return which does not markedly reduce surface nourishment.

Under other poorly understood circumstances there occurs the, so-called, bullous edema wherein the mucosal surface is raised in circular blebs of varying sizes and heights. In its milder forms this type of edema is characterized by an accumulation of minute bleb-like excrescences and, in its most marked forms, the blebs are elongated until they appear almost as large pedunculated retention cysts. The surface color varies from a translucent whitish color to the most flaming red, depending upon the amount of true surface inflammation present. Such an edematous arrangement is due to the hexagonal attachment of the mucosa to the underlying musculature. (Figs. 371, 372, 373.)

Instead of the formation of these greatly raised bullae there at times occur in the presence of mild, long-standing irritation, rounded, slightly raised blebs to which have been given the name "cystitis cystica." (Figs. 415 and 416.) Rarely do these lesions give the impression of being actively inflammatory. They are covered with mucous membrane which is but little paler than that surrounding them.

In the presence of surface denudation, particularly if the process has continued for some length of time, there occasionally takes place a proliferative change having much of the appearance of deep-red, exuberant granulations. These may raise markedly above the surface, forming true granulomata. This change is particularly apt to occur in the posterior bladder wall, that area so commonly exhibiting pseudoglandular cell nests.

Again, bladder irritation may occasion areas of mucosal devitalization. These are of a whitish appearance and generally are confined to the trigone. (Fig. 399.)

There may occur a pseudomembranous change which again is usually confined to the trigone. And there may occur that striking condition known as leukoplakia. (Fig. 412.)

In the bladder of the aged there commonly form brownish or yellowish, lentiform excrescences surrounded by normal mucous membrane, the so-called "cystitis lentiformis." (Fig. 288.)

Instead of the various lesions that so obviously are the results of local inflammation, there may be seen large or small areas of submucosal hemorrhages. These often stand out as red blotches against a background of normal mucous membrane. Under other circumstances there may be a true hemorrhagic cystitis wherein these mucosal hemorrhages are a part of a preexisting inflammatory reaction associated with both redness and edema of the surrounding mucous membrane. Either of these types of submucosal hemorrhage may break directly through the surface and cause free bleeding.

Fig. 371.



Fig. 372.



Fig. 373.

Fig. 371.—Edema bulbosum of the bladder base. These blebs are easily differentiated from papillary carcinoma by their globular regularity.

Fig. 372.—Cushion type of vesical edema.

Fig. 373.—Edema bulbosum of the smaller bleb type.

There may occur that extremely painful condition variously called elusive ulcer, Hunner ulcer, panmural cystitis, et cetera, which, unless the cystoscopist is alert, may entirely escape the eye or may be confused with true hemorrhagic cystitis.

Thus, it will be seen that there is such a multiplicity of bladder pictures presented to the eye of the cystoscopist as to require much judgment in their interpretation. Comparatively few of them are pathognomonic of their causal conditions but merely of the differing reactions of this inter-

esting mucous membrane to the many types of irritation to which it is subjected. While they vary roughly with the intensity of the irritant and the depth to which the bladder wall is involved, they show the widest variations to apparently identical influences in different individuals and in different portions of the same bladder. With but few exceptions, we may say, that smooth mucous membrane bespeaks superficial irritation wherein the submucosal spaces are not markedly involved. When these become involved there appear the various types of edema, surface roughening or surface denudation. All of which is equivalent to saying that the character of the bladder surface is a rough index of the severity of the irritant and the depth to which it extends into the bladder wall.

And, having propounded a near-rule, we immediately are faced with the exceptions to it. We see our panmural cystitis causing no surface rough-

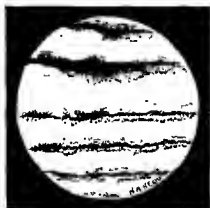


Fig. 374.

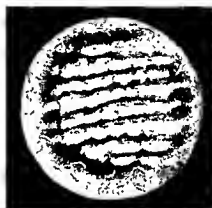


Fig. 375.

Fig. 374.—Close view of the transverse plications commonly seen in the apex of the bladder after the use of an indwelling catheter. They are prone to be mistaken for new growth but disappear within two weeks of the removal of the catheter.

Fig. 375.—Distant view of the transverse plications of the mucosa of the bladder apex due to an indwelling catheter. (Fig. 374, a close view.)

ness. We see venous return impeded without causing edema. We see massive lymphatic block without obvious bladder wall change. We see some bladders subjected to great deep or superficial influences without surface change and others that give the most violent reactions of many types upon almost no irritation. We see tuberculosis causing a multiplicity of these lesions or causing none of them, though present in the kidney to a marked degree. And we realize that skill and accuracy in cystoscopic diagnosis are matters of picture memory, good judgment, and a close study of causes, rather than a dreamy viewing of bladder-wall pictures.

#### ACUTE CYSTITIS

Cystoscopically the word "acute" has been subjected to some confusion in that it has been used in its true meaning of short and sharp, and in a perverted sense of active. Thus active inflammations have been misnamed "acute," though they have been of such long duration as to merit well the

appellation "chronic." In the present event the word acute is taken in its proper sense—short and active.

While the existence of acute cystitis is an outstanding contraindication to cystoscopy, there occur, upon rare occasions, conditions demanding cystoscopic interference. And these are of sufficient frequency to give to the observant cystoscopist a composite mental picture of the changes that so rapidly follow one another. First, there appears a brush like accentuation of the small capillary twigs at the ends of the visible arterial tree (Fig 370). After a short while, these are obscured by a reddening of the mucous membrane. This surface flush increases to a flaming red which spreads over a portion or all of the bladder wall.

Such an inflammatory reaction may start upon any portion of the bladder wall and extend onto the trigone, but it far more commonly starts on the extremely sensitive trigonal mucosa. Here it may be confined, as is the case with gonococcal involvement, or it may spread to the entire wall. In either event, it is associated with marked evidences of bladder intolerance to fluids, frequency of urination, tenesmus, pyuria, and the like.

Having reached such a stage it may clear up speedily. The symptoms gradually subside and within a short time the mucosa has resumed its former appearance. If, on the other hand, the cause persists, the reaction may subside into a relatively inactive state wherein the surface shows but a slight reddening and the circulation everywhere becomes visible, often decidedly prominent—the typical picture of chronic superficial cystitis. If as so commonly happens, there is deep mucosal involvement the inflammatory reaction may remain active. The surface continues to be intensely red, the circulation is not visible, the superficial layers of epithelium may be shed and large or small areas of denudation may persist. There may be, and commonly is, a marked swelling and surface roughening with edema of various types.

If the active signs of surface irritation subside, the edema may persist as the result of persisting submucosal interference with tissue fluid return. The bullae lose their red color and persist as pale, translucent blebs. Or, if there has been broad, smooth edema, it, also may persist without surface redness. Even these gradually disappear and the bladder wall assumes its normal appearance.

*During the active stages of such inflammatory reactions there is an outpouring of much mucus and the formation of much pus.* These frequently adhere to denuded areas causing a pseudomembranous appearance or, if there is a marked deposition of urinary salts, there may be a definite surface incrustation. In the absence of surface denudation, these rarely adhere to the membrane but are seen as large or small flakes on the bladder base.

In the presence of limited areas of acute cystitis, the location involved at times, offers an indication as to the cause. If the trigone alone is involved, gonorrhea should be suspected, particularly if the involvement is characterized by an intense velvety, red, slightly swollen mucous membrane which merges at the limits of the trigone with perfectly normal mucous membrane. An acute basal cystitis also may result from prostatic or renal infection. Inflammation of the posterior bladder wall alone would suggest the possibility of extravesical infection, unless there was an absolute intolerance to fluid in the bladder, when it would suggest upper tract infection.

by virtue of the fact that this portion of the bladder wall overlies the ureteral orifices when the bladder is empty. Hence, it is in constant contact with the small amount of urine such bladders do contain and may be so much more sensitive to irritation than is the trigone that the latter escapes the so-called "inoculation cystitis."

Acute inflammation confined to one side of the trigone whether it does or does not involve the ureteral orifice suggests renal infection on that side. If so placed and associated with marked edema of the ureteral orifice and ridge, it suggests low-lying ureteral stone with infection. Particularly is this so if there are associated submucosal hemorrhages.

Generalized acute cystitis does not as a rule give these indications as to possible cause. It may be occasioned by such a multiplicity of things that it seldom is, of itself, a safe indication of cause. There may be, however, such associated lesions as vesical outlet obstruction, vesical new growth, stone, rectovesical fistulation or other things that, of themselves, give the key for a solution of the diagnostic problem.

#### SUBACUTE AND CHRONIC CYSTITIS

Few things are more protean in appearance than are the vesical evidences of subacute and chronic cystitis. They range from the mildest, lack-luster appearance of the mucosal surface on through the various pictures of violent



Fig. 376.

Fig. 376.—Worm-like stream of pus coming from the ureter of a patient with long-standing pyonephrosis, causing chronic cystitis.



Fig. 377.

Fig. 377.—Vesical opening of a rectovesical fistula, serving as an infective feeder to the bladder.

redness with their various types of edema and denudation, to granulomatous excrescences and ulcerations. And, like acute cystitis, they may be due to such a vast assortment of influences as to defy description. Causes, both near and remote, may account for their persistence.

As to location, however, they may be as highly indicative of their cause as are the arrangements of limited areas of acute cystitis. If so, they are to be classified as are the latter. Even when generalized, these inflammations may at times be indicative of their causes. There may be present expanses so characteristic of certain causal conditions as to leave one in no doubt re-

garding the primary factors at play. There may be the dusky phosphate flecked appearance so characteristic of staphylococcic infection of the kidney pelvis, the contracted scar bands so common to healed tuberculous ulcerations, true tubercle formations, the perichthial hemorrhages so indicative of distant focal infective absorption, the localized tumefactions so suggestive of rectovesical fistula, and a host of other things that not only point the direction of further study but give indication of what its result will be.

Aside from their possible diagnostic importance, the pictures caused at times by long standing bladder inflammations are of a highly misleading sort. So closely do the edematous and proliferative changes in the bladder resemble the various types of benign and malignant new growths that they many times have been thus diagnosed. Occasionally they are of such similarity that nothing short of biopsy can differentiate them. Particularly is



Fig. 378

Fig. 378. Stream of inspissated pus being forced into the bladder from a large cavity in the prostate that had opened into that viscus. The underlying cause for prolonged cystitis.



Fig. 379

Fig. 379.—Rent in the bladder wall three years after the application of radium to the uterine cervix. Two years later it had healed entirely leaving only a thin line of paleness. Treated as chronic cystitis for three years.

this true of papillary carcinoma which may be almost identical in appearance with lesions solely of inflammatory causation. Few things require greater care than does the differentiation of these two lesions and often, it is a wise plan to withhold an opinion until a second study or a biopsy is made. In few places is hasty diagnosis more likely to mislead.

#### HABIT BLADDERS

The minor changes produced in the bladder by certain urinary and sexual habits often are decidedly characteristic. At times, these changes are not to be classed as minor but are of such a pronounced nature as readily to be mistaken for other things. A knowledge of these changes and the habits that produce them is of great value to the cystoscopist, often aiding him in the removal of symptoms that cause considerable annoyance to the patient. Most of these symptoms are of a minor character but it is the

experience of every urologist that the lesser annoyances often are far harder to remove than are others. Usually, this great difficulty rests in a lack of discovery of the initial causes leading to the symptom-producing condition.

In an analysis of the various vesical and posterior urethral pictures resulting from these habits one must be alert for very slight departures from the normal. Perhaps he gets his first hint from the fact that there is an absence of gross change that could serve as an explanation for the symptoms experienced. Again, he may be led to the suspicion that habit is a factor by the absence of explanations of gross changes that are present.

Among the habits most commonly causing these conditions might be mentioned the following: psychologic meddling with urination, abnormal fear of injuring the bladder by allowing it to hold too much urine, and great prolongation of the sexual act. In a former communication upon the subject, the writer described them under the following headings: habit trabeculation, habit pseudocontraction, habit pseudo-atony, and coitus prolongatus. These also have received general consideration in previous pages.

**Habit Trabeculation.**—There is a surprising number of patients who, instead of making of urination an act of muscle relaxation, transform it into one of muscle contracting and sphincter forcing. Instead of waiting for sphincteric relaxation, they greatly increase intra-abdominal pressure in order to force the urine through the sphincters. Often, the habit originates when the patient finds it impossible to empty his bladder when others are present. This disability, which is one of the most common of all urinary difficulties, is put in its proper place by most individuals. In the minds of some individuals there is formed the idea that something is radically wrong, and there follows much psychologic meddling with the urinary act, which eventuates in some fixed ideas regarding the matter. Such persons usually approach the act with the idea that it is going to be difficult. Upon so delicate a mental balance does sphincteric relaxation hang, that it needs but the thought of failure to cause it to fail. Repeated experiences of this nature so fix the impression of disability that no time is given for mental concentration upon relaxation. They immediately start to force urination and, with much practice, they find it, for them, a much quicker and easier way to empty the bladder.

The results of this habit vary, according to its duration, from the mild type of bladder trabeculation to conditions so advanced that they differ in no way from those seen in long-standing vesical outlet obstructions.

In their earliest stages they most often raise the question of a spinal cord lesion. There is, however, no vesical outlet relaxation that is so characteristic of that condition. And there are no other obtainable data suggesting cord involvement. This latter is not always of great diagnostic importance, owing to the fact that the bladder often is involved in tabes in the absence of demonstrable changes in the reflexes or spinal fluid. The diagnosis depends upon the discovery of the urinary habit and the absence of vesical outlet relaxation.

In the presence of the more pronounced grades of trabeculation, grades that show a picture of muscular vigor foreign to tabes, the diagnosis depends upon the discovery of the long-continued habit and the total absence of vesical outlet or urethral obstruction.

One occasionally encounters patients who have been addicted to this



habit for years who show no marked vesical trabeculation but in whom one or more large diverticular openings are seen. While habit trabeculation is rather common in men it occurs only occasionally in the female.

**Habit Pseudocontracture**—In this condition the patient, usually neurotically inclined, has developed the fixed idea that something is wrong with his bladder and that he will injure it if he allows it to distend greatly. He frequently states that he has had a weak bladder for years. At times, he traces the trouble back to a time when he was compelled to hold his urine until the bladder was decidedly overdistended. The pain of this overdistention, and the difficulty in emptying the viscus under the circumstances, convinces him that he has done a dangerous thing and that he must never repeat it. Before long he goes to the other extreme, he voids every time he becomes conscious of any amount of fluid in his bladder. After a time the summons comes earlier and earlier and he never disregards it. His comfort carrying capacity grows less and less and his urinations become more and more frequent. Eventually he arises several times at night and, then consults his doctor.

Usually, his doctor fails to resort to arithmetic by dividing the amount of urine he passes in twenty four hours by the amount of urine he passes each time. Instead he gives all sorts of medicines without benefit while the patient's bladder grows smaller and smaller from disuse.

The cystoscopist finds an abnormally small, but otherwise normal bladder and unless aware of the condition, is prone to let it go at that. If aware of it, he easily demonstrates with his irrigating fluid that there is a vast difference between the comfort capacity and the potential capacity of the patient's bladder. There is decided discomfort when a few ounces of fluid are allowed to flow into his bladder. This discomfort soon ceases and does not return until perhaps 12 or more ounces of fluid have entered the viscus when he has the sensation of other patients who have a really full bladder.

Given these findings with a complete absence of local pathology to account for the condition one need have little doubt as to the true cause. Confirmation of the habit readily is obtained from the patient and the treatment is obvious. The condition is not so common in women as it is in men but it accounts for the urinary frequency of a goodly number of them.

**Habit Pseudo atony**—This bladder condition, vastly more common in the female, is the exact opposite of pseudocontracture. Being due to holding the urine for abnormally long periods of time it is productive of no symptoms and is discovered only through the cystoscopic finding of a bladder of enormous capacity, with thin walls covered by quite a pale mucous membrane.

The finding is not so common in these days when people have not the false modesty about seeking urinary relief that prevailed in the Victorian era and the years immediately thereafter.

Habit pseudo atony needs no treatment, the cause is easily revealed by inquiry, and its recognition is of importance only as an explanation for a condition which otherwise might be attributed to neuromuscular etiology.

**Coitus Prolongatus**—The habit of greatly prolonging the sexual act rather commonly stores up for the male much future discomfort. Often it gives him symptoms that are likely to mislead his physician into the belief that there is a lesion of considerable seriousness which he is unable to find.

Under the heading of *Minor Changes in Intravesical Contour* the bladder picture, and in the section on *Coitus Prolongatus* the symptoms resulting from this practice have been discussed.

**Masturbation and Coitus Interruptus.**—While both these conditions have been said to cause many urogenital symptoms, the writer has been utterly unable to verify these beliefs. Aside from the enlargement of the verumontanum so characteristic of masturbation, and an occasional trigonal injection associated with a mild degree of discomfort, he knows of no fixed local changes due to these practices. Both have been discussed under their appropriate headings in the section on Sexual Disorders.

It is probable that masturbation causes more frequent trigonal disturbances in the female than in the male, but even here, it paints no cystoscopic picture that is not more frequently caused by other things.

### VESICAL TRABECULATION

By vesical trabeculation is meant a condition wherein the muscle fasciculi of the bladder are thrown into such prominence that they raise the inner surface of the viscus in such a way as to make it possible to visualize their effects. Normally, the surface of the bladder mucosa, when the organ is dilated, lies smoothly over an invisible musculature. This condition of muscle



Fig. 380.—The finer type of vesical trabeculation so commonly seen in *tuberculosis* and at the end of a prolonged cystoscopy.

invisibility does not of necessity require a definite pathologic factor to obliterate it, however. One easily can cause the muscle fasciculi to become visible by too quickly filling the bladder or by continuing his cystoscopic study for any great length of time. In fact, by the end of almost every cystoscopy the bladder musculature has rebelled sufficiently to bring itself into evidence.

Trabeculation of the bladder is so important a phenomenon from a diagnostic standpoint that one should search carefully for its minor grades at the beginning of his cystoscopy if he would avoid error. To wait until the muscle has rebelled against the insult of cystoscopy commonly is to interpret as true trabeculation this temporary show of muscle temper.

The milder grades of trabeculation generally are confined to a muscle visibility running from above the ureteral orifices well up on the postero-lateral aspects of the bladder wall. The more pronounced grades of trabec-

ulation usually involve the entire posterior half of the bladder, often extending well forward on the lateral walls

There are many causes of vesical trabeculation ranging from the physiologic reaction to intravesical insult, through the realms of spinal cord change and vicious urinary habits to the coarse muscle hypertrophy of a bladder repeatedly trying to empty itself despite an obstruction to its doing so. It is probable that, aside from the trabeculation caused by cystoscopy alone, all forms of it are really evidences of back pressure. At first thought, this would seem not to be true. Our most usual form of the lesser grades of trabeculation so commonly found in tabes seemingly offers a definite contradiction to this until one analyzes what happens to the urinary function of the tabetic before he develops his characteristic cystoscopic trabeculation and vesical outlet relaxation. As elsewhere has been pointed out, there is in the early stages of tabes a loss of neuromuscular balance to the extent that the sphincters of the lower tract do not respond so readily to the will as they should. Not only do they fail to relax promptly, but the



Fig. 381—Marked vesical trabeculation with "cellule" formation from prostatic hypertrophy

patient almost invariably tries to force them by straining. Frequently they fail to stay relaxed after they once have opened. They click shut and the patient must reset the psychologic stage. Frequently, he does a bit more straining. Usually, this stage of malfunction is not so prolonged as to cause the more pronounced trabeculation if, indeed, it could occur in muscles whose nerve impulses were reduced so greatly. That this might take place is suggested by the fact that at times one encounters prostatic obstruction and tabes in the same patient and finds coarse trabeculation present. Coarse trabeculation, however, is a matter of many months of trying to overcome the effects of obstruction and it is probable that even in these cases, the coarse trabeculation was there before the tabes could write its finer bladder pictures.

Coarse trabeculation is probably always a matter of prolonged back pressure. However, it should not be assumed that this increased intravesical pressure is due only to obstructive pathology at the vesical outlet or distal thereto. The writer has seen a number of grossly trabeculated bladders that were due solely to years of forcing the normal sphincters instead of

mentally causing them to relax. As elsewhere is stated, this is rather a common mode of accomplishing the act of urination in those individuals whose psychic set-up prevents them from urinating when others are present. Some few get the idea in early childhood that something is wrong and continue the habit throughout life, much to the detriment of the bladder. Others do not develop the habit until middle life or after. In these days when almost every man beyond the age of fifty begins to wonder about his prostate, it is rather common to find the varying grades of trabeculation in patients devoid of any pathology beyond a pathologic mental fixation on all the dire things the prostate is supposed to do to all of those who approach those years that men call "old."

In the advanced stages of vesical trabeculation it is not uncommon for pockets of varying sizes and depths to form between the muscle bands. To the shallower of these pocketings the rather poor term "cellule" has been given, while the far deeper ones have been viewed as true diverticula. As a rule, there is little difficulty in determining whether one is dealing with one or the other. If he cannot see the bottom of the depression it is probable that the pocketing has assumed the proportions of a diverticulum, as one easily can hold his cystoscope so as to reveal the shallowness of a cellule. Of course, it is possible at times to see the distal wall of a diverticulum where its opening is large, but one has no doubt about its classification.

#### BLADDER DIVERTICULATION

The question of the congenital origin of vesical diverticula has been discussed for years and, in the minds of many, is not yet settled. That these outpushings of the bladder wall have been demonstrated in the fetus upon several occasions does not in any sense prove that even a fair proportion of the large number of diverticula encountered cystoscopically are of congenital origin. The demonstration of diverticula at all ages, and their marked frequency in the presence of obstructive conditions of the vesical outlet and urethra, favoring great increases of intravesical pressure through the straining thus occasioned, gives ample evidence of such a causation for most of them. A glance at the bladder musculature by transmitted light, as has been said elsewhere, demonstrates the great weakness of certain portions of the vesical wall and proves conclusively that these portions were not constructed in a way to withstand great increases in intravesical pressure. It is at these points of obvious weakness that most diverticula occur. In fact, diverticula at other areas are extremely uncommon. As a rule, those higher on the posterolateral bladder walls are so placed because of the enormous dilatation of the bladder that occurs in some patients prior to the formation of the diverticulum. Pseudodiverticulation at the apex of the bladder nearly always is no more than a patulous urachus.

Diverticula may be single or multiple and may be of all sizes, from the slightest herniation of the bladder wall through the musculature to cavities far exceeding in capacity that of the bladder from which they originated. Their thin walls offer little resistance to the increases of intravesical pressure so common in their presence, and it is not surprising that they should assume the proportions that they so often do. The size of their opening into the bladder is seldom an index of the size of the cavity beyond.

So striking and characteristic are the openings of diverticula that one would assume that they could not be overlooked by the cystoscopist. And, yet, they commonly do escape observation by those of wide experience. This seldom is the case in the presence of large openings from the bladder but occurs in those with small orifices showing a marked sphincteric action. These at times are overlooked entirely or mistaken for minor vesical cellulites in the presence of marked trabeculation. Such errors usually are to be attributed to the fact that the bladder has not been dilated completely during study. Occasionally they result from the far too common conviction that most bladder pathology is confined to the base, and a consequent failure to study the whole bladder.

The close association of most diverticula with the region adjacent to the ureteral ridge and orifice may produce interference with ureteral drainage and precipitate pathology in the upper urinary tract. This may occur as the result of traction on the ureteral ridge or external pressure upon the

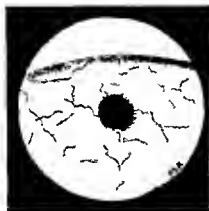


Fig 382



Fig 383

Fig 382—Opening in the apex of the bladder due to a paralous urachus

Fig 383 Vesical opening of a large diverticulum. Openings of this type easily are overlooked unless the bladder is well filled

ureter itself. At times the opening may be so close to the ureteral orifice that it is pulled into the diverticular cavity, more often it is seen on the edge of its opening.

Of particular importance in the study of such cases are the determination of the size of these cavities, the directions in which they are forced and their ability to empty themselves at urination. These are questions that cannot possibly be answered by cystoscopic inspection of the bladder cavity alone. Seldom can the cystoscope be passed into the diverticular cavity and when it can there is afforded only a rough estimation of the size and the character of its mucous membrane. To complete the study of the diverticulated bladder one must resort to cystography as described elsewhere.

**Treatment.**—The appropriate treatment of diverticulation of the bladder depends upon so many factors that the most exhaustive studies should be carried out before advice is given. Not only must one consider the questions of cause but he often must give even greater thought to results. In the latter loom such questions as general condition, size, number, location

and direction of the diverticula, their relations to other structures, their power to empty, and the presence or absence of infection. Few operations require greater surgical skill than do those aimed at the removal of these vesical deformities, and there are many patients whose chances of life and comfort are far greater without operative interference. Many of these may be improved greatly even in the presence of infection by appropriate bladder lavage or the oral use of some of the newer urinary antiseptics. Many of them who are not fit subjects for diverticulectomy must be relieved of a causal obstructive condition, some by electric excision and others by open operation. At open operation it may be possible to enlarge the diverticular opening in such a way as to increase its possibility of emptying. Few conditions require greater judgment and few need more careful individualization.

#### TUBERCULOUS CYSTITIS

Tuberculosis of the bladder might, with considerable truth, be called "the great imitator," for it causes a greater multiplicity of vesical lesions than does any other disease—lesions that are often so typical of other things that it is a simple matter to misread them. Despite this, it also causes lesions of so typical a character that the careful and experienced cystoscopist rarely is misled by its imitation of other things.

The one most common typical bladder lesion of tuberculosis is the minute tubercle. This lesion is a small, round excrescence with a yellowish center surrounded by a narrow areola of deep red. (Fig. 384.) The nearest thing to it in appearance that occurs in the bladder is the minute papule of bilharzial infestation and, in America, this is so rare as to amount to little as a confusing problem.

A rare, but equally typical tuberculous lesion is the so-called inoculation ulcer previously mentioned. These ulcers are found in the apex of an absolutely intolerant bladder. There usually are several of them running transversely across the bladder apex. They stand out strikingly on an otherwise normal bladder mucosa. Irregular in outline, covered with a yellowish membrane and surrounded by a narrow areola of bright red, they resemble no other lesion. (Fig. 385.) They can be seen upon but one day in a given case, for the vesical dilatation of the cystoscopy precipitates a violently acute generalized cystitis that entirely obliterates them visually.

Primary vesical tuberculosis probably does not occur, the lesion being predominantly secondary to renal tuberculosis. Its reputed occurrence as the result of tuberculosis in the prostate or seminal vesicle in the absence of renal infection, though a clinical possibility, must be one of the rarest of happenings. Pathologically possible, it almost may be disregarded clinically. Being, then, secondary to renal involvement in almost, if not all of the cases, it shows in its earliest manifestations a definite tendency to cling to the side of the bladder corresponding to the renal infection. Even in the presence of marked general vesical involvement, there usually is a visible excess of pathology on the side of the renal infection. Showing a marked tendency to pyramid its pathology on both the bladder base and the posterior bladder wall, it usually creates greater evidence of trouble on the corresponding ureteral ridge and orifice. And, though the opposite ureteral area may take part in the general basal pathology, it seldom shows such a marked change as does that on the side of the renal disease.

Starting with a slight redness at the ureteral orifice and perhaps a few typical tubercles in close proximity to it, the mucosa becomes markedly swollen. From this area the disease spreads over its own side of the bladder.



Fig 384

Fig 384—Typical vesical tubercles



Fig 385

Fig 385—Unusual type of vesical tuberculosis. Other than these areas, which are always at the apex of the viscus the bladder wall looks normal. Cystoscopy changes this so quickly that in two days the entire mucosa becomes of a fiery red color and the ulcerations no longer can be seen.

and later to the other side frequently involving the entire bladder wall. There may occur all types of edematous manifestations from broad flat areas to the most pronounced bullae. Commonly, there occurs much surface denudation which becomes covered with smudges of mucus. Pro-

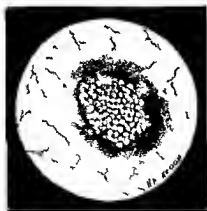


Fig 386

Fig 386 Tuberculous granuloma of the bladder. Commonly confused with malignancy and syphilis. They disappear on the administration of neoarsphenamine.

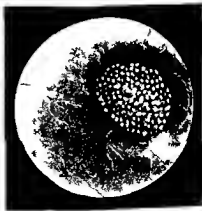


Fig 387

Fig 387—Tuberculous granuloma of the bladder

liferative granulomatous masses occasionally build up beyond the surface level and are easily confused with malignancy. These tuberculous granulomata have been mistaken for syphilitic granulomata. The fact that they promptly disappear following the administration of the arsenicals has made

such a view seem eminently satisfying from a diagnostic viewpoint and often has caused their true cause to be overlooked. (See Syphilis of the Bladder.)

If the intense inflammation subsides, there often are left definite areas of ulceration, radiating from which are raised bands of scar formation. Late in the infection, when the disease in the bladder recedes, the mucous membrane becomes paler than normal and the ureteral orifice on the infected side becomes round and fails to close—the so-called “golf-hole” orifice. (Fig. 388.) Or, if the ureter has been markedly infected, it shortens and pulls the orifice into the bladder wall, leaving its entrance on the bladder side of a funnel shape, the so-called “dragged-out” orifice. (Fig. 389.) In either case the orifice is retrodisplaced from 0.5 to 2 or more centimeters, while its fellow remains in its normal position. The golf-hole, dragged-out, and markedly displaced orifices are seldom present within the first three years of the disease. They are manifestations of Nature’s efforts toward overcoming the infection.



Fig. 388.



Fig. 389.

Fig. 388.—The so-called “golf-hole” ureteral orifice of long-standing renal tuberculosis.

Fig. 389.—The retracted or “dragged-out” ureteral orifice of advanced renal and ureteral tuberculosis. Three small tubercles above the orifice.

While tuberculous cystitis usually presents to the cystoscopist’s eye unmistakable evidence of its true character, there occur a number of advanced cases in which these are not present. Even then, little doubt remains in his mind, for it is extremely rare for any disease other than tuberculosis to cause the multiplicity of lesions seen in the same bladder at the same time. This, together with the fact that there is usually more pathology on one side than on the other, rarely leaves him in doubt about the lesions being due to tuberculosis, and he usually is able to say which kidney is the cause. He rarely has any doubt about the presence of tubercle bacilli in the urine.

Aside from the appearance of the vesical mucous membrane, the extreme sensitiveness of the bladder to dilatation or instrumentation is highly indicative of tuberculosis. Rarely does one encounter in his cystoscopic studies such evidences of extreme pain to the slightest manipulation as are exhibited by the patient with a markedly tuberculous bladder. Indeed, it is not necessary that a large expanse of the bladder be affected, as one often



encounters this extreme sensitiveness in the presence of isolated areas of tuberculous infiltration particularly where surface denudation exists. Extreme pain also is experienced by the patient who shows but a few inoculation ulcers at the apex of an otherwise normal bladder.

An equal degree of pain may be experienced by the patient having areas of panmural cystitis but it is difficult to confuse this lesion with tuberculosis.

Again given extreme pain to even the gentlest of manipulations, a violently inflamed bladder mucosa and marked contraction of that viscus to the extent that it holds but an ounce or two of fluid and one would have perhaps less than 1 per cent of error if he called all of them tuberculosis.



Fig. 390. A cluster of typical vesical tubercles and two small punched-out ulcerations. Secondary to right renal tuberculosis.

And it would be a simple matter to discover those wherein an error had been made for they would be the only ones whose urine did not contain tubercle bacilli that could be found on the briefest of searches as a rule.

**Treatment**—The treatment of tuberculosis of the bladder has been discussed under the same heading in the first part of the book.

### VESICAL CALCULUS

Stone in the bladder is more common in some geographic localities than in others but it occurs in almost all localities with sufficient frequency to give the cystoscopist of even moderate experience considerable familiarity with it. Although vesical calculus has been considered for centuries to give more definitely pathognomonic symptoms than almost any other urogenital condition the cystoscope and the x ray have shown the opposite to be the case in an enormous proportion of the cases. One does not go far in cystoscopy without being impressed by the fact that he seldom finds a stone in the patients giving the most typical symptoms. He more commonly discovers them where he least suspected their presence. So true is this that it casts a strong suspicion upon diagnoses of vesical stone based upon symptoms alone. For these usually turn out to be either vesical tuberculosis or new growth. This however is in consonance with many other things that cystoscopic studies have taught us regarding urogenital pathology.

One would be led to assume that the visual possibilities of cystoscopy would make the missing of a stone in the bladder at cystoscopic study almost an impossibility. This is far from being the case, for stones not uncommonly are found at operation that had been overlooked by cystoscopists of some experience. Most of these are discovered in patients with great enlargement of the median prostatic lobe, and were not seen earlier because they rested in a transverse sulcus at the base of the bladder. There are others not so placed that are overlooked, stones of such size that it seems impossible that they could have escaped detection. Some of these errors are due to a lack of thoroughness, of course, but a few are not. The writer upon several occasions has been on the verge of withdrawing the cystoscope after what he considered a careful vesical inspection when he was surprised to see the edge of a good-sized stone roll into his visual field. This unquestionably was due to the constant shifting of the stone by the tip of the instrument so that it was kept out of the field of vision, a thing



Fig. 391.



Fig. 392.

Fig. 391.—Soft calcium phosphate calculi.

Fig. 392.—Calcium oxalate stone with small areas of calcium phosphate.

rarely possible except with fairly large calculi. To have such a stone escape detection at cystoscopy does not minister to self-conceit when it is drawn from the bladder at operation. The presence of a diverticulum furnishes an acceptable alibi, which is lacking in other bladders.

At times, one sees at cystoscopy such a small segment of stone as to occasion doubt, if it be covered with mucus, as to its being stone. Not a few times such stones have been taken for vesical growths. Such an error is easily made if one is careless in his study, for the appearance of some portions of stones covered with mucus often is difficult to differentiate from mucous membrane. With sufficient care there is no excuse for the error being made. For, while a stone may at times resemble a tumor, the stone can be moved en masse and presents a hardness not found in tumors of the bladder. Even incrustated tumors should not cause the cystoscopist error. While these may look somewhat like calculi they are fastened to the bladder wall and cannot be shifted greatly in position by the cystoscope. They never approach the hardness of stone, and it is a

simple matter to knock off some of the phosphatic incrustation with the beak of the scope and thus expose the tumor surface

It is not always an easy matter to determine how many stones there are in the bladder and it is common in the presence of multiple calculi, to find more at operation than were seen at cystoscopic study



Fig 393



Fig 394

Fig 393—Multiple phosphatic calculi lying back of a greatly enlarged median prostatic lobe. Marked trabeculation with cellule formation

Fig 394—Jack stone calcium oxalate calculus

A more common error than any of these is to be so interested in looking at the stone that one fails to complete the rest of his study. For the finding of a vesical calculus brings into the mind so many problems regarding how it is to be removed as to lure one into overlooking the probable reasons why the stone is there.



Fig 395—A calcium phosphate-covered uric acid calculus

It really is rather rare that the removal of the stone is the only surgical problem presented by the patient. Vesical stone usually means urinary stasis, and the most careful study of the emptying possibilities of the bladder should be made before any surgical measures for removal of the stone are contemplated. To leave the reason for the stone usually means another stone later on. If the stone originated in the bladder it probably did so

because of vesical outlet obstruction or diverticulum. And, if it originated in the kidney, it probably stayed in the bladder because that viscus could not empty itself properly.

The writer has seen quite a few patients who had had several suprapubic operations for the removal of stones and found it hard to understand how the operator could have overlooked the prostatic hypertrophy or median prostatic bar. The presence of stone in the bladder not only brings up the questions of vesical outlet obstruction and diverticulum, but also casts a suspicion on the kidneys, even in the absence of a history of ureteral colic—a suspicion which should not be dismissed without the most careful x-ray study.

Aside from these matters, the cystoscopist is interested in the size and composition of the stone, for upon this, frequently, depends the decision as to the method of its removal. There are stones that rather easily may be removed by the cystoscopic rongeur, there are others that may be crushed and there are those too dense to be crushed. A determination of these points is particularly important in these days of the excision of vesical outlet obstructions by electric or punch methods. Open operations are not done so often as they formerly were for these conditions and, if one's findings are not so accurate as they should be, much unnecessary work may be occasioned.

In judging the size of stones it should be remembered that they almost invariably look much larger than they really are. For this reason, great care should be taken to view the stone at as great a distance from the cystoscope as possible. Particularly is this true of the smaller stones and, even then, one is prone to errors in judgment. Often, it is considered that a stone can be removed without breaking when it is far too large to lend itself to that method of extraction. Usually this error is due to too great an allowance for cystoscopic magnification. This, however, is not an error of too great importance, providing one realizes that a stone which does not fall into the Young's rongeur blades so that they almost can be closed will not pass through the urethra without great trauma to it, and desists from trying to remove such a stone in that manner.

It is in the stones too large to be removed through the urethra without breaking, that the cystoscopist is most interested in the question of composition. Particularly is this true in those patients who do not, for other reasons, need open operation. Of course, dense stones of enormous size must be removed in this way, but one can crush rather large stones providing they are not too hard.

Vesical calculi are rarely of uniform composition, for one sees an enormous proportion of them partially or completely covered with a layer of phosphates. And, as phosphate stones are soft and lend themselves readily to crushing, it is important that one study them carefully to make sure that he is not really dealing with one composed of calcium oxalate. Calcium oxalate stones are, not uncommonly, too dense for crushing and, if of any size, must be removed otherwise. Upon rare occasions, spiculated or jack-stone oxalate calculi can have the spicules broken by the use of the cystoscopic lithotrite so that the core and spicules may be removed urethrally. Such stones are rare, however, and it can be said safely that most calcium oxalate stones of any great size require open operation.

Calcium oxalate stones almost always can be told by their color being either a very dark brown or black. Rarely are they so entirely covered with phosphates that their dark coloring is not visible. Usually they are of the rough mulberry type and the phosphates if present are only in the depressions between the bosses. At times they are smooth flattened or rounded stones. Rarely they are of the jack stone type. Almost always they show their characteristic coloring on some surface.

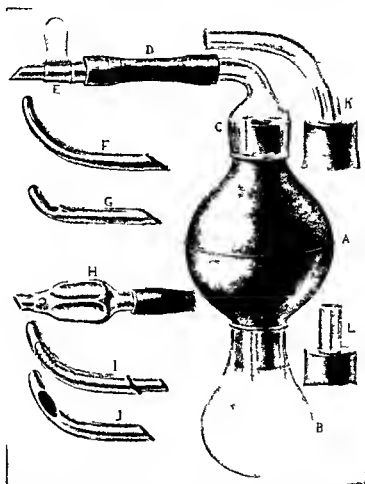


Fig. 396 Young's simplified evacuator for the removal by suction of stone fragments and blood-clot from the bladder. It can be used with the cystoscope or the Belgow and French types of evacuating tubes. (Young's Practice of Urology W. B. Saunders Co., Philadelphia.)

Urate or uric acid stones are of a pale yellow or light brown color. They usually are smooth but occasionally show small nodulations. They are soft and easily broken.

Phosphate stones are smooth or granular of surface and unless covered with mucus, are of a glistening white appearance. They are commonly multiple, often are of great size but are soft and easily broken. If they present a faceted appearance they do so because there are more than one of

them. If silver nitrate irrigations have been carried out, they may have a metallic appearance and may range from a blue to almost a black in color. Being soft, they may absorb and hold the color of the various dyes given for urinary infection.

Stones composed of cystin, xanthin and other substances usually cannot be diagnosed cystoscopically, but, if one excludes the dark-brown and black stones he need have no fear in advising the crushing of all of the others of appropriate size for such a procedure.

Even though the cystoscopist feels that he surely has removed both the stone and the reason for it, he does not do well by his patient to dismiss him as cured. Recurrent stones are common things and it is far better for the patient that they be discovered at a time when they easily may be removed per urethram. In other words, a cystoscopic study should be done on such patients by the end of three months and should be repeated at six-month or yearly periods for the next few years.

In the presence of stones of such size as not to lend themselves to removal with the Young's rongeur, it usually falls to the cystoscopist's lot to advise the method of their removal best suited to the local findings and the patient's general condition. Upon his proper judgment, frequently the health, indeed the life of the patient depends. It, thus, becomes highly important that his study develop the indications for either litholapaxy or open operation. In obtaining this he does well not to let his judgment be swayed too strongly toward litholapaxy just because it carries the lower average mortality and is less of an ordeal for the patient. He should remember that, though open operation carries the higher mortality, it does so largely because it is done on patients of a far different type from those upon whom the lesser procedure is indicated.

Into his judgment must enter such questions as: What should be done to the vesical outlet obstruction? What is the condition of the bladder and the patient? Is the stone so large or of such dense texture that litholapaxy may fail? Is the urethral lumen too small for the passage of the rather large instruments for the removal of fragments? If litholapaxy must be stopped before the fragments are removed, is the patient of such a mental type that he would submit to their removal at a later session? And there are even other questions that one must be able to answer before his judgment is safe to follow. Thus, it can be seen that there are a few things that require far more than just dreamy admiration of the interesting pictures observed.

Aside from the estimation of size, density, bladder pathology and like things, there must be a thorough knowledge of the contraindications to litholapaxy in any patient, however well suited for it he may be otherwise. Among the chief contraindications may be mentioned the following: childhood, urethral stricture that does not lend itself well to previous dilatation, back-pressure, cellulation of the bladder, great enlargement of the median lobe of the prostate, marked active cystitis, diverticulum, sacculated stones, new growths of the bladder, large bilateral hypertrophy with greatly dilated mucosal veins, marked hematuria, small contracted bladder, and many cases of marked vesical or upper tract infection.

Certainly, in the presence of marked bladder infection efforts should be made to control it prior to litholapaxy, if great danger of pyelonephritis is

to be avoided. Where electric excision of the minor grades of vesical outlet obstruction is contemplated, it is necessary that the stone receive first attention.

### URETEROCELE

At some time it falls to the lot of most cystoscopists to discover a large cystic mass protruding from the normal site of the ureteral orifice. Occasionally, the condition is observed on both sides. The mass is a globular or elongated affair with all the characteristics of a thin walled cyst. It may be seen to undergo increases and reductions in size. If the bladder is forcibly distended by the irrigating solution it may disappear entirely to return promptly when the overdistention of the bladder is relieved. Careful search of its extremity usually reveals a minute ureteral meatus from which a small spurt of urine occasionally comes. If the mass is greatly elongated it often seems to go through a vermicular motion as the ureteral peristaltic wave descends (Fig 397).

As a rule, these cystic dilatations are almost lacking in muscle tissue, having as their walls an inner and outer layer of mucous membrane with



Fig 397—Cystic dilatation of the ureteral extremity ureteroceles. The orifice was made larger by fulguration.

little areolar tissue. They may attain such great size as to obstruct the vesical outlet, and in the female they have been known to protrude from the urinary meatus.

The prolonged ureteral back pressure which they occasion may cause both ureteral and pelvic dilatation, a true hydro ureter with hydronephrosis. Occasionally, the urinary retardation may be the precipitating factor in stone formation. In themselves, ureteroceles are symptomless unless they obstruct the vesical outlet. They usually are observed in studies for other things, at times, for the upper tract pathology, they cause.

**Treatment.**—The treatment calls for the making of a more capacious ureteral orifice, which may be done either with the cystoscopic scissors or by fulguration. Because of the lessened danger from bleeding the latter is preferable. By either method the opening made should be a generous one, and the result should be examined again at a later period to make sure that ureteral emptying is complete.

## ATONY OF THE BLADDER

*In this connection the term atony of the bladder is confined to that small number of cases wherein the bladder wall is dilated, flaccid, and almost totally lacking in propulsive force, and where there is no obstruction to urination, or disease of the brain or spinal cord to explain it. Usually, the bladder is highly lacking in pain sense. Often the patient urinates but once or twice in the twenty-four hours, and then more from habit than from conscious need. Often the bladder is not emptied by urination, as a result of which a large amount of residual is present. The patient occasionally reaches a state of complete retention or has an overflow of retention.*

According to Moore, various explanations of the disorder have been given by its different students. Thomson-Walker, who first described it in 1910, attributed it to a localized lesion in the hypogastric plexus. Geraghty studied several cases at autopsy and could find no evidence of spinal cord disease. Casper felt that it was due to muscle degeneration without a nerve lesion. Braasch described two types: Those in which there is motor disturbance alone and those in which there is both motor and sensory disturbance, evidently ascribing the cause to a lesion in the peripheral nerve supply of the bladder.

**Symptoms.**—The symptoms are those that characterize neurogenic bladders and are to be differentiated only by a total absence of any other factors denoting such a cause.

**Diagnosis.**—Cystoscopically the condition is in every way analogous with the bladder of tabes. There usually is a large amount of residual urine that flows through the cystoscope only when it is practically in the long axis of the body. If it is raised slightly, the flow ceases. There may be loss of sensation in the bladder mucosa.

**Treatment.**—The same local treatment that is applicable to the previously described ingravescient type of neurogenic bladder is indicated. However, it is in this type of dysfunction that presacral neurectomy has given such excellent results and it probably should be resorted to where other methods of treatment have failed.

## FRANK PSEUDOMEMBRANOUS TRIGONITIS

This trigonal lesion, of as yet unknown cause, and occurring solely in the female, is rare in comparison with what the writer has called *Obscure Pseudomembranous Trigonitis* (later discussed under that heading). Just how frequently it occurs, it is not possible to say, but at least a dozen cases of it have been encountered by the author. It is a lesion that could not possibly escape the attention of anyone with even a minimum of cystoscopic experience. For it stands out prominently as a yellowish or pinkish-white pseudomembrane usually covering the entire trigone and, often, extending through the vesical outlet. Upon most occasions, it is surrounded by a narrow, red margin, beyond which the circulation for, perhaps, one-half centimeter is more prominent than is that of the rest of the bladder. Almost invariably the general bladder wall is normal.

**Pathology.**—The microscopic appearance of sections of pseudomembranous trigonitis are virtually those of leukoplakia in miniature. There are many layers of epithelial cells that have become almost hyaline. The top



layers may show almost a keratinization and are in all stages of detachment. Viewing them one is aware of their similarity to the lesions found in the lower animals as the result of vitamin A deficiency—so similar in fact, as to raise a question of perhaps like etiology.

**Symptoms**—The symptoms are those of any other trigonal lesion of moment—vesical discomfort, frequency of urination, often burning on urination, occasionally tenesmus, and where the lesion extends through the vesical outlet, the escape of a few drops of blood at the end of urination.

If there is no other pathology, the urine is clear and normal except for the presence of abnormal numbers of epithelial cells, a fact that, together with the other symptoms, is highly suggestive of the malady.

**Treatment**—The treatment largely is that of mild destruction of the hyalinized area and stimulation of the true tissue cells. This may be done by the direct application, after bladder anesthetization, of 3 per cent silver nitrate solution to the affected area through the Kelly cystoscope. Following such a procedure and in fact the ones to be described, it is well to leave an ounce of 3 per cent liquid guaiacol in olive oil in the bladder.



Fig. 398. Frank pseudomembranous trigonitis.

Cure usually can be brought about in a slower but more comfortable way by means of the injection of increasing strengths of silver nitrate solutions at three to five day intervals. Such injections should start with a 1 per cent solution and later be increased to as high as 3 per cent as tolerance increases. Usually it is possible to increase 1 per cent at each successive treatment. About an ounce of the silver solution should be injected into the bladder and kept in for about five minutes, during which time the patient should be in a sitting position. After this it should be drained and replaced by the olive oil, which should be retained by the patient as long as possible. It is best in office work not to inject strengths of silver nitrate solution above 3 per cent unless one wants a decidedly miserable patient on his hands.

Macalpine and others have advised light surface fulguration of the lesion. Undoubtedly, this would be more immediate and thorough in its destructive effects, but it would leave a far more uncomfortable patient, as the after symptoms from trigonal fulgurations are none too pleasant to bear, as

a rule. It probably is kinder to reserve this procedure for those who are not cured by the simpler method of injecting silver nitrate into the bladder.

The previously mentioned similarity of the lesions to those of vitamin A deficiency may be a therapeutic lead, though the writer has no present experience to support the idea. The result of a dark-adaption eye test would be of interest.

#### OBSCURE PSEUDOMEMBRANOUS TRIGONITIS (TRIGONITIS AREATA ALBA)

Some years ago,<sup>1</sup> the writer described under the second of the above titles the lesions under discussion. In 1935,<sup>2</sup> there were reported 42 cases, and since that time at least as many more cases have been seen. Occurring only in the female, this seeming insignificant trigonal change accounts for, probably, 90 per cent of the frequencies of urination of sudden onset and accompanied by a normal urine in that sex. Its pathology is that of a very superficial hyalinization of the trigonal epithelium.

**Etiology.**—The cause is not known. Because the first cases were encountered largely in young, unmarried women, a few of whom seemed rather prudish, it was felt that it might be due to masturbation. Since then, it has been seen in women of practically all ages, even to the eighth decade, and of all types. And, certainly, there now is no suggestion that it is of a sexual nature.

As has been suggested in the discussion of Frank Pseudomembranous Trigonitis, the lesion so closely resembles the mucosal ones found in the smaller animals on a diet deficient in vitamin A that there is a possibility that it may have something to do with its causation.

**Description of the Lesion.**—The lesions are almost invariably confined to the right posterior portion of the trigone. Upon only a few occasions have they been seen on the left posterior region. Rarely, they cover the trigone and extend through the vesical outlet. Usually, they are irregularly triangular in outline with one angle at the corresponding ureteral orifice. At times, the entire right side of the trigone is involved and, in such cases, it is not unusual for the area to extend through the vesical outlet. (Figs. 399 and 400.)

In appearance they look as though the membrane had been touched with the weakest solution of silver nitrate that possibly could cause surface blanching. Upon only one or two occasions has there been any reddening of the mucosa at the edges. Usually they are so faint that they cannot be seen if one looks directly down upon them with the cystoscope. It generally is necessary to place the lens in such a position as to give a view almost across the patch. At such a visual angle it readily is seen that the surface cells are much paler than are those of the rest of the trigone. This change is so slight as not to obscure the trigonal circulation.

**Symptoms.**—The cases very readily lend themselves to description in two different symptomatic groups, particularly as to onset and duration. In the most common type there is, for no apparent reason, a sudden attack of urinary frequency associated with some trigonal discomfort and, often, some slight burning on urination. If the lesion extends into the vesical out-

<sup>1</sup> Surg., Gynec. and Obst., October, 1924.

<sup>2</sup> Ann. of Surg., January, 1935.

let, there is greater frequency and burning and much more discomfort after urination. Not infrequently, in these cases, there is a slight terminal hematuria. The discomfort lasts for from two to about six weeks and subsides as suddenly as it appears. Recurrences of symptoms are common, though they rarely take place in less than several months—often not for several years.

In cases of the other type the symptoms come on gradually and may last for months or years. In one patient they had persisted for as long as twenty one years. Usually, in these cases, the symptoms seem more severe, but this may be due solely to the nervous states so common to prolonged bladder discomfort. Not only is their urinary frequency pronounced during the day, but it disturbs sleep to a greater degree than usually is the case with the others. Aside from these differences they resemble the first group symptomatically.

**Diagnosis**—The symptoms together with the normal urine, are so highly suggestive that they should lead to a most careful study of the trigone from



Fig 399



Fig 400

Fig 399—Obscure pseudomembranous trigonitis

Fig 400—Two areas of obscure pseudomembranous trigonitis.

every possible visual angle. Indeed their history is so characteristic that one probably could cure most, if not all of them without cystoscopic confirmation. None of them have the bladder pain so characteristic of parietal cystitis and few of them are so uncomfortable as are those with frank pseudomembranous trigonitis. Once having seen the lesion the cystoscopist has very little difficulty in its later recognition.

**Treatment.**—Other than, perhaps, the relief of symptoms, oral medication is of little avail. The symptoms often can be reduced greatly by the taking of 2 calceose tablets a half hour after meals and 4 at bed time. The taking of 1 dram of camphorated tincture of opium before retiring commonly will assure a more restful night, as will also the stronger opiates, if they ever are indicated.

The condition however, is so easily cured by local treatment, as a rule, as to make little call for pain relievers except, possibly, for a night or two after such treatments have been given. With but few exceptions a few injections of weak silver nitrate solution followed by the sedative oil as de

scribed under the heading of Frank Pseudomembranous Trigonitis, is all that is needed.

Upon rare occasions, this treatment fails to produce prompt cure and one is compelled to go after matters a trifle more energetically. Perhaps the best way to do this is by the injection of a 5 per cent silver nitrate solution directly on the area by means of a bevel-ended ureteral catheter. This should be done only when there is sufficient fluid in the bladder to dilute the silver solution immediately after it leaves the trigone. Such a mode of treatment practically always clears up the most resistant cases and avoids the need for surface fulguration. After it, the patient is likely to have a moderately uncomfortable bladder for some time and, if this is not controlled by the sedative oil, it often is kind to prescribe either paregoric or codeine.

If a dark-adaption eye test shows a vitamin A deficiency it is possible that recurrences might be prevented by a correction of the deficiency.

#### PANMURAL CYSTITIS

This bladder lesion, known also as Hunner ulcer, elusive ulcer, localized submucous fibrosis, and by a number of other names, is one of the most painful of bladder conditions, as well as one of the most commonly overlooked. The lesion was described in 1915 by Hunner, though, from the following quotation from Wolbarst's translation of Luys' work on Cystoscopy and Urethroscopy (page 201), a somewhat similar condition apparently was described by Nitze long before that time under the name of "parenchymatous cystitis":

"Nitze describes a pathologic condition of the vesical mucosa in which the entire wall of the bladder is completely changed by intense inflammations, or those of long duration; in this condition because of the presence of scar tissue, the vesical wall can no longer distend itself without producing pain. In these cases some portions of the mucosa are found in a highly inflamed condition, glossy, bright red, well circumscribed and without special shape, surrounded by mucous membrane which is normal or but slightly inflamed. The affected part seems very smooth and glossy, and upon its surface are seen little raised areas like grains of sand which are very red in color. When such a bladder is filled with water and the patient suffers very acute pain, the cystoscope shows a little crack or tear in the bright red glossy portions in which bleeding takes place."

At first panmural cystitis was supposed to occur only in the female, but it has been encountered by others in the male bladder. Its occurrence in the male is, however, an extreme rarity, the writer feels, for he never has seen one in many thousands of cystoscopies. Despite the fact that his cystoscopies are predominantly done in the male he has seen a number of cases in the far smaller percentages of females he has studied.

Etiology.—The etiology of panmural cystitis is not accurately known. There is a definite tendency to attribute it to distant foci of infection, though this view is not based upon any highly convincing proof. That a goodly percentage of its victims do have such distant infections urges respect for its possible focal infective origin to the extent that attention should be given to them. Being confined to no definite age, marital, social, or dis-

ease group leaves its true course to conjecture alone. Nitze's opinion that tuberculosis was a frequent cause has received no clinical support in this country. The generally normal urine and the subsequent history in no way suggest such an etiology.

Fister<sup>1</sup> has compared the lesions with those of lupus erythematosus and suggests the use of gold sodium thiosulfate.

**Pathology**—Microscopic study of the involved portions of the bladder shows the process to encompass the entire thickness of its wall in most cases. Occasionally, however, the serous coat is not involved. The submucous and muscular coats show much round cell infiltration, which, in many places, has gone on to fibrous tissue formation.

**Symptoms**—The most outstanding symptom of panmural cystitis is pain. Often the patient can put the finger on the lower abdomen and point to the area in the bladder that shows most involvement. The pain, often, is of the most excruciating character. It is worse when the bladder is somewhat distended, but it may be increased by jarring the body or by increased intestinal peristalsis. At times the pain is referred to the thighs, the rectum, or the back.

Because of the pain or vesical distention there is a frequency of urination. There commonly is marked urgency and, at times, extremely painful tenesmus. Even terminal hematuria may occur. Bladder intolerance may be so great as to cause almost a urinary incontinence from vesical spasm.

Other than the possible microscopic findings of a few red blood cells, the urine usually is normal. In fact, it is the occurrence of a normal urine in the presence of such marked vesical symptoms that makes it almost safe for the cystoscopist to predict the finding of the characteristic bladder lesions.

**Cystoscopic Appearance**—To one familiar with the cystoscopic appearance of the lesions of panmural cystitis there is little excuse for their being overlooked. To one less used to cystoscopy they are likely to be confused with the red patches that form so quickly on the bladder mucous membrane as the result of slight instrumental trauma. They may be easily differentiated by virtue of the fact that the latter do not split and bleed, nor do they cause acute pain when the viscus is dilated.

While there usually is a visible blanched area of the bladder mucosa in immediate proximity with the flushed area that first attracts the cystoscopist's eye this may be so slight as to escape notice. In fact, in most cases the blanched area is hardly in evidence. This probably is due largely to the fact that the lesions usually are confined to the upper posterior wall and apex of the bladder, where close vision is not so easily possible. The writer saw a number of cases before he even noticed that there was a blanched area, a fact that turned out to be therapeutic good fortune, as will be pointed out under the discussion on treatment. Recently there has been encountered a case in which the area of cystitis was much paler than the rest of the mucosa and the writer would have overlooked it if it had not been for a festoon of visible marginal vessels that stopped sharply at the edge of the blanched area. An effort has been made to depict this in figures 401 and 402.

<sup>1</sup> Jour Urol., 40: 37, 1938.

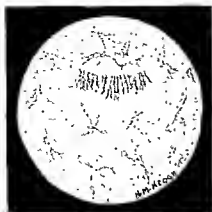


Fig. 401.



Fig. 402.

Fig. 401.—Unusual lesion of panmural cystitis. Above is the usual blanching area and below a festoon of small blood vessels. Cured by light fulguration.

Fig. 402.—Same lesion seen in figure 401 but showing two splits in the mucosa as the result of vesical dilatation.



Fig. 403.—Typical lesions of panmural cystitis. (Hinnman, Principles and Practice of Urology, W. B. Saunders Co., Philadelphia.)

As one watches this usually flushed area during the distention of the bladder he notices that it has a tendency to fade slightly in color long before the bladder is moderately well distended. As dilatation increases there occur one or more linear cracks across the lesion with consequent capillary oozing. Unless the patient has been anesthetized for cystoscopy it will be noticed that the evidences of pain have steadily increased as dilatation progressed and that the patient insists upon a halt at about the time that the mucous membrane splits. Further dilatation rarely is tolerated.

If one still has any doubt about the character of the lesion he only has to brush a ureteral catheter slowly across the bladder wall and see what happens as it crosses the area under suspicion. The extreme sensitiveness of the lesion will settle any doubts which he may have.

**Treatment.**—The true cause not being known little of a preventive nature is possible. That foci of infection are under suspicion urges a study for the most common ones in tonsils and teeth.

As has been suggested previously the writer's failure to discover the associated blanched areas was the means of causing him to follow a milder



Fig 404 Small ulceration commonly occurring on the scars resulting from the deep fulguration of areas of panmural cystitis. This one had persisted for eight years.

course in the treatment of panmural cystitis than usually is advised. It is present day teaching that electric fulguration is the treatment of choice but that the fulguration must cover both the flushed and blanched portions of the bladder wall and that it must be of a type that would influence the deeper coats. In fact, some have been so energetic in this regard that intra or extraperitoneal rupture has occurred immediately as the result of vesical dilatation or later from tissue destruction.

It has been the writer's custom to pay attention only to the flushed areas and to make no attempt to fulgurate them deeply. In fact he has made it a point to try to confine his burn to the mucosal layer alone, going carefully and lightly over the entire surfaces of any injected areas. This has been done with a degree of vesical dilatation just sufficient to make the surface approachable but never sufficient to cause a mucosal split.

Carried out in this way general anesthesia usually can be dispensed with. The previous injection of a local anesthetic into the bladder dulls the pain to a considerable extent but does not obliterate it. However if one avoids

great vesical dilatation, makes his fulgurations lightly, and gives a period of rest after each application of the current, he finds it possible to cover the areas usually found. He hurts his patient but he has placed her in no danger of later emergency surgery. Nor has he been so strenuous in his treatment that she must look forward to all of the discomforts that can and often do attend the subsequent scarring from deep fulguration. Further, she is in no greater danger of recurrences.

After such a treatment as has been described an ounce or more of 3 per cent liquid guaiacol in olive oil is injected into the emptied bladder and allowed to remain as long as possible. The oil injections, if carried out daily for several days, relieve greatly and often prevent the after-discomfort of the fulguration. Usually, if all of the areas have been treated, by the end of a week the patient has no bladder discomfort and finds it possible to start training the bladder to hold more urine.

It is well to instruct such a patient to return promptly if the symptoms recur, as they often do within the succeeding few years, for it is far easier to treat small areas than one or more larger ones.

Throughout the years it has fallen to the lot of the writer to try to give relief to the victims of deeper fulgurations. One who has tried to bring about healing in the small ulcerations so often found on the center of one of the stellate scars present, will not think lightly of them. They are just painful ulcerations due to a lack of good blood supply and they act as would be expected. Such a condition is shown in figure 404. Despite the most careful treatment over a period of several years the ulcer is still present and the patient is still uncomfortable. Probably nothing short of surgical extirpation will cure it.

In the presence of many or very large areas of panmural cystitis it is wiser to employ either general, spinal or caudal anesthesia in order to cover them at one session. Even under such circumstances, the same care should be taken to avoid both great vesical distention and deep fulguration. To disregard these is to give the patient a much longer and a far more painful convalescence.

The writer has been told by several urologists that they have obtained cure of this condition by the use of sulfanilamide alone. Though he has asked, they have not put their findings in writing so that they may be quoted. If this really is true, it speaks much for a possible focal infective causation. In any event, it is well worth a trial.

### INCRUSTED CYSTITIS

While it is possible that incrustations of the bladder wall may occur when the urine is acid, they must do so with only the most extreme rarity. In fact, the condition is so constantly associated with a highly alkaline urine that it rather commonly is designated "alkaline incrustated cystitis."

Usually, long before a diagnosis has been made, there have been present in the urine slugs of whitish material which give a gritty feeling when rolled between the fingers, and the patient has been conscious of the passage of sand-like particles. Commonly, there have been many attempts at cure either by bladder washings or oral medication. The urine is of a decided ammoniacal odor, blood-tinged and, usually, so cloudy that the patient



speaks of the foul urine along with the recital of the most annoying bladder symptoms

**Etiology**—The occurrence of incrustated cystitis probably always begins as some type of vesical inflammation wherein surface denudation furnishes an attachment for the urinary salts that make up the incrustation. Not uncommonly this denuding cystitis is the result of vesical trauma, either instrumental or chemical. If one believes with Hagar that the condition is due alone to the *Proteus ammoniae*, which germ is introduced only directly from without, there must be either instruments or fluids introduced into the bladder to serve as transporting media. If, however, he follows Randall's view this by no means need be the case. For in the report of his cases<sup>1</sup> Randall cites the occurrence of *Streptococcus haemolyticus*, *Streptococcus viridans* and a colon bacillus of the Morgan type. This latter he admits may have been a *Salmonella ammoniae*, though it was not culturally true to type. As these incrustations differ only in the extent of



Fig. 405 Alkaline incrustation of the bladder wall

surface covered from those rather commonly encountered in patients with vesical growths that have undergone surface necrosis, and in patients who have had prolonged chronic cystitis and in whom the passage of sand was a late manifestation, both in the entire absence of any type of intravesical treatment it is obvious that such a mode of bacterial transportation is by no means necessary. It is also obvious that if Hagar is correct regarding the bacterial cause, the *Proteus ammoniae* may get into the bladder cavity by routes other than direct introduction.

It is at least safe to say that the extreme alkalinity of the urine is due to the rapid splitting of the urinary urea by bacterial action and that there must be some discontinuity of the bladder surface to furnish a site of attachment for the mucus and salts forming the incrustation. Catheterization during the puerperium, following operations and in cases of prostatic obstruction are common starting points for the conditions bringing about the incrustations.

**Pathology**—The incrustations are markedly adherent to the surface and when removed show a denuded area which, at times, extends even to the muscular coat. The areas intervening between those of incrustation are

<sup>1</sup> Jour. Urol., Feb., 1937

covered by a thick, tenacious mucus containing desquamated cells and blood elements. These are easily removed from the underlying mucosa, which, though inflamed, is not ulcerated.

According to Randall, "The microscopic picture is one of ulceration of the mucosa with lymphatic and polymorphonuclear infiltration of the submucosa and muscularis. Calcium phosphate and calcium-magnesium phosphate crystals may be seen in the depths of the ulcer." In a recent case of the writer's, ammoniomagnesium phosphate crystals far outnumbered all other crystals.

Randall's work seems to prove conclusively that there is some kidney pelvis pathology or infection in many cases, though Hagar, seemingly, is of the opposite view.

**Symptoms.**—The symptoms are those of violent bladder disturbance together with the passage of flakes of sand-filled material. There is marked bladder intolerance to even small quantities of fluid, burning, and, if the lesion approaches the vesical outlet, there is tenesmus and, at times, terminal bleeding. General health usually is not impaired, except insofar as interference with sleep has disturbed it.

Usually, there is a history of a milder grade of bladder disturbance over a long period of time before these severe symptoms set in.

The urine is cloudy, highly ammoniacal in odor, and, on microscopic study, shows countless urinary crystals, some red blood-cells with, usually, a minimum of pus cells.

**Diagnosis.**—The chronicity of the lesion, usually starting as a mild cystitis and becoming atrociously acute in its symptoms, the finding of gelatinous, sand-filled slugs in a urine of unusually high alkalinity, and the character of the urinary sediment, all would strongly suggest the presence of the lesions. The true diagnosis is made by the cystoscopic finding of the incrustations.

**Cystoscopic Findings.**—Usually, there is an intense general cystitis showing one or more areas of grayish-white incrustation, which gives a sensation of grittiness when touched by the beak of the cystoscope. They have an appearance of looseness of texture, in contradistinction to the solid, almost frozen appearance of leukoplakia. They may be sharply margined but, more commonly, have edges of a frayed-out appearance, and frequently they are surrounded by lighter textured areas that are not so firmly attached to the mucous membrane as are the areas of true incrustation. These latter are rather firmly attached and their separation from the mucosa causes bleeding. On the contrary, the more mucoid parts occasionally found at their edges, or, more commonly, lying between incrustated areas, can be easily brushed aside without causing bleeding. At first, one may occasionally be confused by calculus or by new growth. Stone can be moved by the beak of the cystoscope and new growth is raised further above the level of the bladder wall. It practically never is so thoroughly incrustated that a differentiation cannot be made. The incrustated idiopathic chronic ulcer is so rare as to offer little likelihood of confusion.

**Treatment.**—Probably most cases of incrustated cystitis could be prevented in all intravesical procedures by the most careful aseptic technic, since most of the cases occur in those who have been catheterized.

In the presence of the lesion, the treatment rests in a prolonged reversal

of the urine to the acid side of neutrality. That this cannot be done by the oral use of those things generally so efficient in other conditions, is outstanding. All who have written upon the subject have reported an utter inability to greatly lower the high degree of alkalinity in this way.

Thus, the treatment is entirely local and rests with efforts at changing the bladder urine by the use of the various acids. A few have reported improvement by the intravesical injection of either lactic acid bacilli or the *Lactobacillus bulgaricus*. The writer met with striking success with the latter upon one occasion but was not able to reproduce it in another.

Randall has had signal success from the use of 1 per cent phosphoric acid solution. Where failures occurred, success usually was obtained by the introduction of a ureteral catheter into the ureter of the side showing the higher pH, leaving it in for some days, and injecting 2 per cent phosphoric acid through it at frequent intervals. It is his opinion that there is a high pH of the urine of one or both kidneys in resistant cases and that, because of this, there was a lack of success from bladder washings alone.

Some bladders are highly intolerant to 1 per cent phosphoric acid and treatment must be started at greater dilutions and gradually increased to that strength. Randall often found it necessary to use boric acid of increasing strengths before the phosphoric acid was started. Under this plan of treatment a case of the writer's, wherein most of the bladder was involved, was entirely cleared up in less than three weeks. Almost at once the vesical pain, tenesmus and frequency were greatly reduced.

Hagar advises the removal of all incrustations by means of curettement, and the application of strong silver nitrate solutions. He, however, does not mention their strengths. In the presence of widespread incrustations this would be no simple task and strong silver nitrate solutions probably would cause much later scarring. And he who has tried to heal the slight ulcerations so common to the centers of stellate scars, will hesitate greatly before using such solutions too freely in the bladder.

### CYSTITIS HAEMORRHAGICA

While bleeding is common in both acute and active chronic inflammation of the bladder mucosa, it has become the custom to limit the term hemorrhagic cystitis to those cases showing large or small areas of submucosal bleeding. And, though areas of hemorrhagic cystitis commonly occur in the region of a ureteral ridge which has a stone in its lumen, these have been eliminated from the classification of hemorrhagic cystitis. Therefore, in the present connection we shall include under this heading only those by no means rare cases, wherein an otherwise normally appearing bladder shows a varying number of definite submucosal hemorrhages.

Such a condition is not uncommon in the presence of the blood dyscrasias, particularly with pernicious anemia. The presence of large or small hemorrhages into the mucous membrane is rather commonly encountered as the result of focal infections. Most commonly these infections are in the teeth, tonsils and prostate gland. The causal organism usually is the streptococcus and it is rare for the bladder to clear up and remain clear so long as the causal infection remains untreated. On the other hand, the vesical lesions spontaneously disappear if the distant infective focus is eradicated.

Panmural cystitis also may be of focal infective origin, but it shows an entirely different line of behavior from that of the lesions under discussion and it is not cured spontaneously by the removal of the causal foci.



Fig. 406.

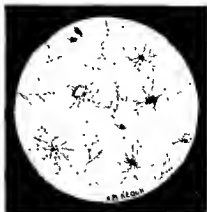


Fig. 407.

Fig. 406.—Unusual type of morbilliform petechiae of focal infective cystitis due to a pair of streptococcic tonsils and disappearing shortly after their removal.

Fig. 407.—Ecchymoses commonly seen in hemorrhagic cystitis of focal infective origin. The lighter spot is due to devitalization and shedding of the superimposed layers of mucous membrane.

There is reason to believe that the ureters and kidney pelvis rather commonly share in this hemorrhagic condition, and there is conclusive evidence that they may show the lesions without concomitant bladder involvement.



Fig. 408.

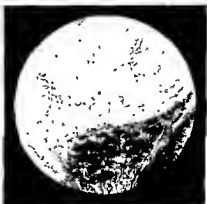


Fig. 409.

Fig. 408.—Hemorrhagic cystitis showing mucosal exfoliation over a larger hemorrhagic area.

Fig. 409.—Small submucosal hemorrhage occurring on the female trigone and giving much vesical discomfort.

Hemorrhagic cystitis may cause either microscopic or macroscopic hematuria. It usually is in the search for the cause of hematuria that the milder and, often, the severer grades are discovered. For it is rare for the lesions to cause symptoms more severe than a slight frequency of urination. Pain and vesical discomfort rarely are present.

The hemorrhagic areas are usually multiple varying in number from two or three to many hundreds. They may be minute petechial spots or large areas of submucosal hemorrhage. They may break through the epithelial covering and allow of the escape of small or large amounts of blood into the bladder. The color of the spots varies with their age passing from an early bright red to a later dark brown and on to a greenish or yellowish hue as they clear up. They may be on any portion of the bladder wall but rarely involve the trigone as is so commonly the case with the submucosal bleeding of low lying ureteral stone.

If there has been a submucosal hemorrhage of any size the overlying mucosa becomes devitalized and sheds in the center of the submucosal clot (Fig. 408.)

Rarely is the bleeding of alarming importance but if it is it usually may be checked quickly by the daily intravenous injection of 10 c.c. of a 10 per cent solution of calcium gluconate. Rarely is it necessary to resort to an indwelling catheter to place the bladder wall at rest.

The possibility of hemorrhagic cystitis luring the cystoscopist into overlooking other and more serious lesions should be kept in mind. For it offers a simple explanation at times for bleeding that it does not cause. Simple hemorrhagic cystitis does not cause pyuria of any great degree and in the presence of much pus in the urine further study for other pathology is urgently needed.

#### CYSTITIS GONORRHOICA

As has been stated elsewhere gonorrheal cystitis usually is solely a trigonitis. Only as the result of trauma or the mucosal changes occurring in the presence of infected residual urine does gonorrhea involve the general bladder wall. In the absence of these latter conditions the inflammation stops sharply within one half centimeter of the trigonal margin. The mucous membrane of the trigone is swollen and of an intense red color that entirely obliterates the fan like trigonal blood vessels.

One of course does not knowingly cystoscope patients with gonorrheal urethrotrigonitis. But at times he is deceived by either the patient's story or the attending physician's recital of the case to introduce a cystoscope into the bladder. So typical is the picture presented by this condition that it takes but a glance to convince him he has made a mistake and the more quickly he withdraws his cystoscope the better it is for the patient. To dreamily view the picture while the bladder is being distended by the dilating solution is an excellent way in which to precipitate epididymitis.

In the female bladder the same danger does not hold of course and if he has made such a mistake he may take time to acquaint himself better with the cystoscopic picture. In women who have had a marked gonococcal urethrocystitis it is not uncommon to find intensely red velvety areas at the lateral margins of the vesical outlet long after the trigone has assumed its normal appearance. Their presence is highly diagnostic and they are not likely to be confused with other things.

Upon two occasions, some years ago the writer was persuaded through misrepresentation by the same physician to cystoscope males with a gonorrheal urethrotrigonitis. Each time the red velvety trigone and the normal

general wall revealed at a glance the true cause of the vesical symptoms and led to the immediate withdrawal of the cystoscope.

#### SYPHILIS OF THE BLADDER

A great many different types of lesions have been described as syphilis of the bladder by various writers. From the illustrations that have appeared of these lesions it is obvious that they do not differ in any respect from lesions caused by many other conditions. They have been described as macules, ulcers, edema and granulomata. And, while it seems probable that syphilis does at times involve the bladder, the writer's experiences have left him in considerable doubt about the frequency of such involvement and have convinced him that more diagnostic proof is needed than a positive Wassermann test, the fact that the lesions clear up under antiluetic treatment, or that tubercle bacilli were not found in the urine. These experiences have been of so striking a nature as to be well worth recounting.

Some years ago he had made a diagnosis of tuberculous granuloma in the bladder of a man well past middle life. Several searches for tubercle bacilli in the urine were made with negative results. To him, the bladder was obviously one of tuberculosis and he obstinately stuck to the diagnosis despite a later demonstration of a strongly positive Wassermann reaction. The patient was cystoscoped again and the writer's associates took the stand that the lesions were vesical syphilis. Much to his surprise they entirely cleared up under neoarsphenamine, so that in six weeks the bladder was entirely normal except for some swelling around the right ureteral orifice. Three months later the patient returned to the hospital with a blocked-off right kidney and in a desperate condition. Autopsy revealed an almost completely destroyed tuberculous kidney.

Shortly after this a similar diagnosis was made by the writer upon a colored man, and his associates took a stand for lues because he had a positive Wassermann test. The patient was given antiluetic treatment and the bladder lesions disappeared. A search of the urine after they had cleared up revealed tubercle bacilli and a nephrectomy revealed advanced renal tuberculosis.

About a year after this last experience, Dr. John B. Lownes reported before the Philadelphia Urological Society a similar case which had cleared up under neoarsphenamine. In his discussion of the report the writer cited the above cases and expressed the hope that Dr. Lownes would let him know when he removed the tuberculous kidney. Some months later Dr. Lownes reported the removal of a greatly destroyed tuberculous kidney from the patient.

From these experiences it is obvious that it either is a simple matter to confuse vesical tuberculosis with syphilis or that syphilis is rather likely to affect the bladders of patients with tuberculous kidneys. There was not the slightest doubt in the writer's mind at the time or since that both of the cases he saw were typically vesical tuberculosis. The fact that they cleared up as the result of neoarsphenamine is no proof of a luetic causation as well, for the writer has seen the same thing happen in cases wherein there was no lues. In fact, he has upon a number of occasions subjected such patients to a course of injections prior to nephrectomy for tuberculosis and

has had the happiest results from the treatment in tuberculous cystitis persisting after nephrectomy

It apparently is necessary that tuberculosis be entirely ruled out by both study and time before it is safe to assume that a given vesical lesion surely is syphilitic

#### ALLERGIC CYSTITIS

It is probable that most cystoscopists who have spent a great deal of effort toward the solution of the causes of vesical symptoms have wondered from time to time if allergy does not play a part in some few patients. Almost periodically the writer has entertained such thoughts and, upon a few occasions, he has about concluded that he has at last found such a case, only to discover upon closer study that he was in error. Suggestions that allergy does at times cause definite vesical symptoms have appeared in the literature ever since allergic manifestations have been studied so closely in other parts of the body. In fact, a few such seeming cases have been reported, but the authentication of them was of a nature not calculated to carry much conviction.

There has been little real proof in the past that allergic cystitis as a separate bladder lesion does occur. It is probable that the writer has not been alone in the feeling that it would be a definite misfortune to dwell too much upon such an etiologic possibility. For it is not outstanding in the realms of literature upon protein sensitization that vesical symptoms play any great part in the findings. Probably all of us would agree that if they did, these students of allergy long ago would have settled the matter for us. We would not find ourselves in doubt after all these years. It now seems, however, that we should not dismiss the matter as we have done, for there can be little doubt that there is such a thing, and the reason why some of us have not seen it is that we have not studied our cases as carefully as we thought we were doing.

Dr E. Clay Shaw reports in his contribution to the Urologists Correspondence Club, February 1937, three such cases, in one of which definite urticarial areas were seen in the bladder. The observation is of such interest that it will be best given by a direct quotation from his writing.

"My attention was first directed in this direction by a dermatological colleague discussing the frequency of bladder irritation that he had observed in association with urticaria from eating mangoes (a tropical fruit indigenous to southern Florida). Some of the cases developed extreme frequency and urgency. A study of the urine usually showed leukocytes and an occasional erythrocyte. The symptoms were evanescent, usually disappearing with the clearing up of the urticaria.

"About three years ago I saw my first case of hives of the bladder. This unfortunate individual was subject to frequent attacks of giant urticaria following the ingestion of a number of foods, especially strawberries and milk. With the occurrence of the skin manifestations he invariably developed marked frequency and urgency of urination that was soon followed by gross hematuria. He consented to cystoscopic examination during one of these attacks and the bladder presented a most interesting appearance. The mucosa was thickly studded with large white wheals, some over 1 cm in diameter, with a surrounding zone of hyperemia and edema from which blood could be seen oozing. In this case the urine showed not only blood

but an unusually large number of leukocytes in the smear. There was heavy albuminuria, suggesting that there might also be renal manifestations of the allergic process. The symptoms and pathological urinary findings always subsided as the urticaria of the skin cleared up.

"A few months later I saw another case that gave a story of urinary frequency and dysuria following the eating of strawberries. It was only after close questioning of the patient, with the previous experience in mind, that a history of urticaria was elicited. He was seen during a typical attack and although the skin manifestations were slight and not so annoying as the urinary symptoms, a slight diffuse urticarial reaction was observed. This case also had moderate benign prostatic hypertrophy that gave no symptoms under ordinary conditions, but produced partial urinary obstruction following the ingestion of strawberries, as indicated by a residual urine of slightly over 100 c.c. on these occasions. The urine under ordinary conditions was negative for pus and red blood-cells, but during an attack showed both of these elements upon microscopic examination. The patient's condition was checked during three of these allergic reactions and on each occasion the symptoms and residual urine disappeared within twenty-four hours. Permission for cystoscopy was not obtained. When last heard of, over a year later, this patient was avoiding strawberries and had no urological symptoms.

"A third case, exhibiting a most interesting allergic manifestation in the genito-urinary tract, has been carefully worked up by my associate, Dr. Jack A. McKenzie. The patient was a man of thirty-four years whose general history was entirely negative except for frequent attacks of hay fever. He consulted us about two years ago, complaining of marked frequency and burning on urination and pain in the perineum. The urine was slightly cloudy in two glasses, negative for albumin and sugar, and microscopically showed a few erythrocytes, many leukocytes, but no bacteria. On abdominal examination neither kidney was enlarged, nor was there any tenderness on pressure over the kidney areas or the suprapubic region. Rectal examination showed the prostate to be moderately enlarged, tense, and tender to pressure; very gentle massage produced a copious secretion that microscopically showed full fields of pus without bacteria. A diagnosis of acute prostatitis was made and the patient was instructed to remain in bed. Much to our surprise he reported at the office two days later feeling comfortable; the urine was clear, the prostate felt normal, and the prostatic secretion showed only six to eight cells per high-power field. About a month later he returned with an exact duplication of his previous attacks of urinary symptoms and findings. At this time he called attention to the fact that the attacks of urinary symptoms seemed to occur simultaneously with the recurrence of hay fever. This patient has been observed over two years and has been checked during eight attacks of hay fever, and on every occasion he developed the symptoms and physical findings of acute prostatitis that cleared up promptly as the hay fever subsided. Repeated examination failed to demonstrate bacteria in either the urine or the prostatic secretion. Given the protein sensitization tests, he has been found to react to a large number, but especially to dog hair, potatoes, and tomatoes. By avoiding these substances he has now been able to go over seven months without an attack of hay fever or prostatitis.



In the three cases described the proof of the allergic nature of the genito urinary pathology lay in the concomitant presence of accepted allergic manifestations elsewhere in the body. Is it not possible that some of our cases of unexplained evanescent dysuria and prostatitis without demonstrable bacteria may be allergic in nature with the reaction confined entirely to the genito urinary tract?

### CYSTITIS EMPHYSEMATOSA

This title has been given to the vesical condition wherein countless air bubbles are formed beneath the epithelial layer. These are globular excrescences varying in size from a few millimeters to a half centimeter or larger. When they are ruptured gas escapes and floats to the top of the bladder.

The condition apparently is an extremely rare one and while it has been observed at autopsy a number of times according to N. L. Burrell, Ravich and Katzen were the first to report the observation of such a case during life in 1937. They give a clear outline in the following quotation from Burrell's<sup>1</sup> report of a case:

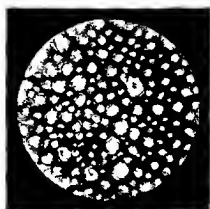


Fig. 410. Cystitis emphysematosa.

the bladder was catheterized and the urine found to be bloody. Cystoscopy was attempted but even after removal of several blood-clots the hematuria continued so profuse that despite prolonged irrigations proper visualization of the bladder was impossible. In view of the continued profuse bleeding of apparently vesical origin immediate cystotomy was deemed necessary as a life saving measure. At operation the bladder presented the characteristic picture of cystitis emphysematosa. The bladder wall was thick and edematous, all layers of the viscus being involved but more especially the mucosa and submucosa. The mucosa of the entire bladder was covered with numerous clear gas-containing vesicles varying in size from a pinhead to a pea. Between the vesicles the mucosa was hemorrhagic everywhere.

Apparently Burrell was the first one to report a case from cystoscopic study. It occurred in a woman with diabetes. Not only was the case dis-

<sup>1</sup>J. ur. Urol. Dec. 1936

covered cystoscopically, but repeated studies were carried out during the time efforts were being made to lower her blood sugar. As this was reduced the gas bubbles gradually disappeared, and they did not return when, through cessation of treatment for diabetes, the blood sugar content increased.

Like Ravich and Katzen, he found marked hematuria present. His description of the cystoscopic picture is as follows: "The entire bladder mucosa was seen to be arranged in linear rugae with a fiery reddish, velvety, granular appearance. Embedded in these folds were hundreds of small spherical transparent silvery globules having the appearance of air bubbles. The mucosa bled very easily with the slightest manipulation of the cystoscope or when the bladder was evacuated for irrigation. It was at first thought the condition was cystitis cystica but further study revealed the true nature of the malady. When these small globules were touched with a ureteral catheter they were seen to rupture and form into smaller spheres and collect in the dome of the bladder surrounding the normal air bubble."

Culture in his case revealed a short, gram-negative bacillus, apparently of the colon group. The patient's serum failed to agglutinate it and it failed to cause similar lesions in the chemically inflamed bladders of rabbits.

The etiology is unknown, though at times it follows vesical instrumentation. The symptoms are those of acute hemorrhagic cystitis. Seemingly, it is more common in women than in men.

**Treatment.**—Although the condition seems more commonly to be a terminal one, it is probable that prophylaxis would be of value, in that gas-producing micro-organisms are not introduced into the bladder, particularly in those with diabetes and weakened physical states. In Burrell's case, cure resulted from proper attention to the existing diabetes. Unless such an underlying cause can be revealed, indications for treatment are none too obvious. Since neoarsphenamine does such unexpectedly favorable things to many bladder lesions, it is well worth a trial.

#### VESICAL VARIX

Dilatation of the superficial veins of the bladder is by no means a rare condition. These are rarely of any great size, however, and it is questionable if they really deserve the name of varix. They commonly are seen passing from the lateral margins of the vesical outlet, where there is no obvious pathology and, occasionally, on the bladder base just posterior to the interureteric ridge. Over the vesical aspects of lateral lobe prostatic hypertrophy they are decidedly common. In the latter event some of them are of considerable size, sufficiently large to be considered as true varices. Particularly prominent dilated veins are commonly seen in the bladders of the aged, being far more common in women than in men.

Occasionally, one encounters enormously dilated venous channels on various parts of the lower half of the bladder wall. At times, these are associated with carcinomatous infiltration of the bladder wall, pelvic inflammation, tumor, or pregnancy, and at others they occur without obvious cause.

Unless their particularly thin walls rupture and occasion hematuria they produce no symptoms. Usually they are observed at cystoscopy for other

conditions Their appearance is so characteristic as to need no description (Fig 411) Errors regarding them hardly are possible



Fig 411—Vesical varices

Being symptomless they require no treatment unless for bleeding This usually may be checked by fulguration Hemorrhage from them at times has been so severe as to demand open operation

#### VESICAL LEUKOPLAKIA

True leukoplakia of the bladder is an extremely rare condition Still, lesions likely to be mistaken for it are not so uncommon Of these the most usual are pseudomembranous lesions of the bladder base and phosphatic incrustations upon superficial erosions These, however, should not mislead the careful cystoscopist The former are likely to have a yellowish white tint and the latter are a brilliant white and definitely raised above the surface On the other hand leukoplakic areas are of a dead white color, flat, only slightly raised above the surrounding surface, as a rule, and usually can be determined to be thick, mucous membrane opacities They have the white, parched appearance so characteristic of lingual leukoplakia At times they are of a grayish cast, and upon rare occasions the lesions may push up from the surface of the bladder sufficiently to make a distinct roll at their edges

Leukoplakia may involve any portion or all of the bladder There may be one or a number of patches, always of irregular outline, presenting a deep-red inflammatory areola, often a generalized cystitis They are firmly attached to the underlying membrane, from which they cannot be moved by a ureteral catheter tip, as is the case with true pseudomembranous lesions and incrustations

The cause of leukoplakia is not known Its association with prolonged inflammation either from infection or calculus trauma is outstanding It is claimed that it shows a marked tendency to undergo malignant change, although Stein as cited by Hagar, is of the opposite view, as the result of his studies The weight of opinion, however is not in accord with his view Once present, leukoplakic spots increase rather than recede The lesions are associated with marked vesical intolerance and pain

The descriptions of the lesions occurring in the bladders of animals on

a diet deficient in vitamin A are so suggestive of those of leukoplakia as to make one wonder if it too could have a like etiologic background.

**Pathology.**—The condition is one of epithelial keratinization, wherein the normal mucosa is changed to a many-layered squamous surface. The germinal layer of the surface remains sharply divided from the submucosal structures unless malignant change takes place. The trigone and its contiguous surfaces more often are involved.

**Symptoms.**—The symptoms usually are those of bladder discomfort, urinary frequency and, if the lesions reach the vesical outlet, pain and, rarely, vesical intolerance that almost precludes the possibility of retaining even small quantities of urine. These pronounced symptoms, probably, are due more to the associated cystitis than to the leukoplakia itself, for there is every reason to believe this area has lost its pain sense. Certainly, one does not elicit much increase of pain by pushing a ureteral catheter into the area.

**Treatment.**—Being of unknown etiology, other than, perhaps, an aftermath of long-standing cystitis, it is possible that the lesions could be

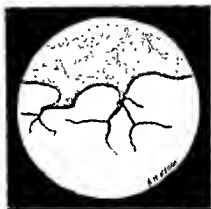


Fig. 412.—Vesical leukoplakia.

prevented by the search for and removal of the cause of each case of prolonged bladder inflammation. So far as the lesion itself is concerned, various methods for its removal have been devised, but most have been unsuccessful. Cure has been reported from the use of neoarsphenamine, and improvement has taken place after such measures as radium treatment, fulguration and curettage.

The immediate call is for relief of the aggravating vesical symptoms and, to this end, the intravesical injection of 3 per cent liquid guaiacol in olive oil has done more in the writer's hands than anything else. Hagar advises segmental resection. When this is not possible, he suggests either the actual cautery or electrocoagulation. Associated lesions in the upper urinary tract are not uncommon and should be searched for and corrected, if possible.

From the similarity of the lesions with those due to vitamin A deficiency it is possible that it might be of some benefit, and would certainly be of interest, if the dark-adaption test were done on a few such cases, to determine if such a deficiency existed.

## MALAKOPLAKIA

This extremely rare bladder lesion is characterized by the presence of round or oval yellowish excrescences of varying sizes upon the bladder mucous membrane (They have likewise been reported in both the kidney pelvis and ureter) They are of unknown etiology and most of us will never see them So rare are they that one must turn to the writings of others for their description and nowhere has the writer found this better done than in the work of Thomson Walker and Barrington as quoted by Macalpine

On cystoscopy there was no difficulty in getting a clear medium The mucous membrane of the bladder with the exception of the trigone and a small area behind this was strewn with yellow plaques which varied in size from a very small point in area to the size of a threepenny piece Viewed from a distance the color was yellowish pink but on closer inspection it was pale yellow



Fig 413 Malakoplakia of the bladder after He tz Boyer

A plaque was flat or nearly so on the surface it had a rolled-over edge and stood up sharply from the mucous membrane The central part was frequently depressed somewhat like the nodules of molluscum contagiosum They were rounded or oval Closely examined they had the appearance of a caseous nodule covered with a thin layer of epithelium Occasionally the base was a little contracted so that the edge rolled over Around the edge of the plaque there was a halo of moderate inflammation in a few plaques but in most of the plaques there was no sign of reaction in the mucous membrane around and there was no ulceration The mucous membrane apart from the plaques, was healthy The ureteric orifices were normal with but slight reddening of the lips

Etiology—As has been said the cause of malakoplakia is not known It has been attributed to tuberculosis by some though autopsy findings have failed to support such a view In most cases colon bacilli are to be found in the lesions, many of them within leukocytes

The lesions are over twice as frequent in females as in males and are more common in middle life and afterward Oppermann as cited by Hinman reported a case in a girl eight years of age

Treatment.—So far as treatment is concerned, little appears in the literature, though Macalpine quotes Kidd as having used fulguration.

#### IDIOPATHIC CHRONIC ULCER OF THE BLADDER

Many years ago Fenwick described what he called "Solitary Ulcer of the Bladder." This title, however, is hardly applicable today, as it has been demonstrated by Buerger, Lazarus, and others that there occasionally is more than one ulcer. Fenwick described the ulcer as of punched-out appearance with slightly elevated, indurated edges and a necrotic base, but with very little early evidence of inflammation elsewhere in the bladder. Later, there is a more generalized cystitis and incrustation of the ulcer. As a terminal result the bladder becomes much contracted. Death occurred as the result of renal infection. Later writers, notably Papin, Buerger and Armstrong and Lazarus do not give such a gloomy outlook to the condition, but report cures by various methods.

Though reports of the condition are rare, it is probable that the lesion is far more common than is supposed. Most cystoscopists of long experience have encountered isolated, shaggy areas of incrustation in an otherwise normal or only slightly inflamed bladder in cases where upper tract infections were not a factor. And it is probable that some of these had as their points of attachment a chronic idiopathic ulcer. The writer can recall several such findings wherein pronounced ulceration was uncovered when the incrustation was cleaned away. One patient, a farmer, had such a patch just above his vesical outlet and, though good visualization of the base of the ulcer was not possible with the regular cystoscope, it could be seen that there was a definite ulcer with a raised edge.

Most of the reported ulcers have been on the trigone, the latest one (by Lazarus) having one above the left ureteral orifice and another that surrounded the right orifice. The remaining bladder wall was normal.

Symptoms.—The symptoms, though they are sufficiently severe to demand cystoscopic study, are in no way different from many other bladder inflammations. Hematuria and pain on urination, marked tenesmus, and frequency due to vesical intolerance are the rule. In some, the condition may go on to complete incontinence for the same reason.

Diagnosis.—The finding of one or more discrete, punched-out ulcers in the bladder without tuberculosis or other demonstrable cause is all that seems necessary for a diagnosis.

Treatment.—As outlined by Lazarus,<sup>1</sup> the treatment is "silver nitrate application, scraping of the ulcers (Fenwick), and excision (Buerger)." Others have reported results from fulguration, and Lazarus cured his case by the use of intravenous neosalvarsan. From this latter it is not to be supposed that his case was of luetic origin, for, as has been pointed out upon several occasions herein, this drug has a surprisingly beneficial effect upon many bladder lesions.

#### VESICAL BILHARZIASIS

Infestation of the bladder by this trematode is almost nonexistent in North America, though it is common in the Near East, particularly in

<sup>1</sup> Jour. Urol., Aug., 1925.

Egypt, and in India, as well as in South Africa and South America. Individuals who have lived in these localities and have become infested occasionally drift into our clinics. The writer has seen two, one of whom, for a small consideration, would attend the clinic for others to see, whenever a note was sent requesting his presence.

The writer is indebted to that excellent book on cystoscopy by Macalpine<sup>1</sup> for the following concise description of this parasite and its life cycle.

The life history of the trematode which is responsible for the disease was worked out by the War Office Expedition (British) under Leiper in 1915. That commission showed that the parasite has an asexual and sexual phase. The former takes place in the liver of a mollusk where sporocysts and daughter sporocysts develop. Either of these can give rise to cercariae—larval structures which the mollusk discharges into the fresh water of ponds, canals, etc. Cercariae are capable of movement and attach themselves to any available mammal, human or other (definitive host). Passing through the unbroken skin they arrive at the liver of the host, and there

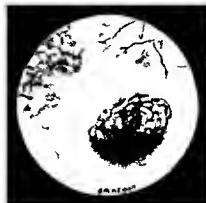


Fig. 414—Several types of lesions due to vesical bilharziasis

develop and differentiate into male and female adult worms (sexual phase). These together migrate, via the inferior mesenteric vein, to the vesical and ureteric terminals. The female lays eggs in clumps under the bladder and ureteric mucosa, which clumps constitute the specific lesions as seen through the cystoscope. Rupturing into the vesical cavity, the eggs are discharged with the urine and hatch out into miracidia, motile bodies which seek out suitable mollusks (planorbis) and recommence the life cycle above described. The discovery of ova and motile miracidia in the urine of a patient is positive evidence of the nature of the complaint."

The cystoscopic appearance of bilharzial involvement of the bladder wall naturally differs with the stage of the disease. Beginning as a minute petechial area, the isolated patch soon develops a slight elevation of the bladder mucosa which in many ways, resembles the isolated tubercle of tuberculous cystitis. The latter, however, always is surrounded by a definite zone of redness, the Bilharz nodule occasionally is, but more often not.

<sup>1</sup>Macalpine J. B., *Cystoscopy and Urography*, William Wood and Company, Baltimore 1936 p. 176

Often, it has the appearance of a small, round fleck of pus fastened to the bladder wall, but no amount of irrigation moves it, as is the case with pus. These isolated nodules may rupture and leave a minute denuded area. More often there are clusters of nodules which may form quite a large granulomatous mass. This may rupture, leaving a good-sized ulcer.

It is not uncommon for these ulcerated, ragged areas to develop into true papillomata and subsequent carcinomatous and sarcomatous changes are not altogether rare. Stones with Bilharz ova as nuclei are common.

### CYSTITIS CYSTICA

Cystitis cystica is characterized by the presence of small, discrete, almost transparent blebs upon the bladder surface. The same condition also may take place in both the kidney pelvis and the ureters. These minute blebs usually are found in the regions of the trigone and vesical outlet, but not uncommonly they are found on other portions of the bladder base. Usually the bladder is not inflamed, but occasionally there may be the fading evidences of a chronic inflammatory condition.



Fig. 415.

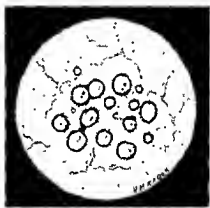


Fig. 416.

Fig. 415.—Mild cystitis cystica.

Fig. 416.—Limited area of the larger blebs of cystitis cystica.

The cysts ordinarily are small, dome-shaped affairs not arranged in clusters and having no circumferential zone of redness. Occasionally they are as large as 0.5 cm. in diameter; rarely they are small waving spheres attached to the bladder mucosa by a very thin pedicle. They are supposed to result from small mucosal cell nests. Usually they occur in bladders that have been the seat of a prolonged, mild inflammation.

As a rule they produce no symptoms, are found in a search for other things, and, from a therapeutic standpoint, largely can be disregarded. Hagar is of the opinion that they account for the so-called irritable bladder of women and young girls and states that they disappear if from 0.25 to 1 per cent silver nitrate or from 1 to 5 per cent strong protein silver is injected into the bladder.



## STAPHYLOCOCCIC CYSTITIS

The constant outpouring of staphylococcus laden urine from one or both kidneys almost invariably produces a bladder picture that is in itself, diagnostic. The condition may or may not be associated with pyuria. In fact, it is rather common to find in these cases that any leukocytes present in the urine come from the bladder and not from the upper urinary tract. The voided urine may be almost clear, macroscopically, though it invariably has some small phosphatic flakes in it. It is alkaline in reaction and, when centrifugated, shows a sediment composed of enormous clusters of staphylococci together with masses of amorphous phosphates.

The vesical picture produced by this condition is characterized by a generalized dusky, reddish color shading toward salmon. The minute capillaries stand out distinctly in great profusion upon this background and, scattered irregularly over it, are small flakes of phosphatic accretions. The



Fig 417

Fig 417—Prominence of the small vessels of the bladder mucosa darkening of the color and the small flakes of phosphates so characteristic of staphylococcic infection of the renal pelvis—staphylococcic cystitis



Fig 418

Fig 418—The bladder wall injection and phosphatic flakes commonly seen in the presence of urea splitting urinary infection

mucosa is smooth throughout, giving the impression of prolonged mild irritation. There never is a suggestion of acuteness just a mild, sluggish type of mucosal reaction.

An effort has been made to delineate this picture in figure 417. When truly visualized it is one of the most safely diagnostic of bladder pictures. In fact, it is one of those things that makes the onlooker think the cystoscopist is trying to show off. The latter is willing to believe that the tubercle bacillus causes characteristic bladder lesions, but when one, from bladder inspection alone, states that one or both upper tract urines will show millions of staphylococci when centrifugated and stained, the onlooker is at least, rather skeptical.

Being a condition secondary solely to an upper tract staphylococcic infestation rather than to infection, the treatment is that of the causal focus. This has been considered under the heading of Staphylococcic Pyelitis. So far as the bladder itself is concerned, no amount of intravesical treatment

will clear up the picture. It may, at times, relieve to some extent the mild frequency of urination by increasing vesical tolerance. However, it is just as likely to increase it, unless very mild solutions for intravesical irrigations or instillations are used.

### VESICAL ENDOMETRIOMA

A number of cases of endometrioma have been reported. These tumors occupy only that portion of the bladder invested with peritoneum and usually are mistaken for growths of other types. They are irregular growths and commonly contain one or several blood-cysts which may be of either a blue or brownish color. These growths undergo a marked increase in size during menstruation.

The most common symptom is hematuria, which may be present only during menstruation. The presence of a nodular, congested mass on the upper posterior bladder wall or at the apex, in the female, should arouse suspicion. If doubt exists, its increase in size and turgescence during menstruation further should increase suspicion and urge the wisdom of biopsy.

Viewed largely as nonmalignant growths, they do at times undergo a malignant change. If this has not occurred, such lesions in the bladder should lend themselves well to destruction by fulguration, unless, as sometimes happens, the growth has extended from the peritoneum. Whether or not irradiation would be of direct benefit has not been shown, so far as the writer knows. Indirectly it might aid through its effect upon the ovary, but such an indirect mode of attack is hardly to be considered seriously during the child-bearing age. Some advise the surgical removal of the involved area.

### FOREIGN BODIES IN THE BLADDER

There seems to be no end to the kinds of foreign bodies that have been recovered from the urinary bladder. There have been reported such things as needles, glass thermometers, asparagus tips, pieces of catheter, nails, chewing gum, paraffin, gauze, hairpins, harpins, slippery-elm bark, pieces of silkworm gut, knife blades and countless other things. Some of these are left at operation, others find their way through the bladder wall, but most of them enter by way of the urethra. Some are lost in efforts at erotic stimulation, others during efforts at abortion, and still others during urethral or vesical treatments.

At times, they become so incrustated by urinary salts as to be almost or quite unrecognizable by cystoscopic inspection. Such incrustations, however, rarely entirely cover large foreign bodies. Even in the presence of smaller objects it usually is possible, by chipping off some of the incrustated material with the cystoscopic forceps, to determine what is serving as the nidus for stone-formation. Many small foreign bodies become so densely enveloped that their presence is discovered only by sawing the stone in two after its removal.

The smaller, smooth foreign bodies in the bladder may cause very little vesical discomfort. This, however, is not the case with elongated or rough objects, which usually cause a marked cystitis and much vesical discomfort or pain.

By the use of our present day cystoscopic armamentarium it is possible to remove most foreign bodies without resorting to open operation. Filiform and similar bodies usually occasion little difficulty, as they generally can be removed with the small flexible cystoscopic forceps. Large elongated bodies that have entered through the urethra usually can be removed by grasping the end between the blades of Young's cystoscopic rongeur. If the body is smooth and shows a tendency to slip from the blades these can be covered by stretching over each one a small piece of thin pure gum

Fig 419



Fig 420



Fig 421

Fig 419—A rectal thermometer in the bladder

Fig 420—An incrustated harpin in the bladder of a female

Fig 421—A harpin in the bladder of a woman

rubber tubing to give a better holding surface. If the object is of such size as to prevent the blades from closing it often is safer to remove it surgically.

Pencils of paraffin usually can be removed with this instrument though it usually is necessary to withdraw and reintroduce the rongeur several times. Xylene has been used by some cystoscopists to dissolve chewing gum. Hottinger reports success by the following method. Twelve cc of xylene was injected into the empty bladder and retained for four hours and

later 50 c.c. was introduced and retained for half an hour. Such a method should be more successful with paraffin as both it and the solvent float to the top of the bladder urine. And, while xylene is a good solvent for chewing gum, it would be difficult to use it for that purpose as the urine would float it away from the heavier substance. Chewing gum is by no means so difficult as paraffin to remove instrumentally, as it becomes firm in con-

Fig. 422.



Fig. 423.



Fig. 424.

Fig. 422.—A pencil of chewing gum in the base of the bladder. The curves of the S were broken with the small *cystoscopic rongeur* and the elongated portions then were removed without difficulty.

Fig. 423.—Piece of gauze sloughing through the anterior vesical wall.

Fig. 424.—Calcium phosphate coated head of a Pezzar catheter that had broken off and remained in the bladder.

sistency when immersed in urine and it lies upon the base of the bladder instead of floating, as does paraffin. Other solvents, such as benzine and benzine with albolene have been used for the same purpose without harming the vesical mucosa. As these produce much sensory disturbance, it is best to keep the patient under an opiate during and for some time after their use.

The fore-oblique Stern-McCarthy cystoscope is a much more useful in-

strument for the removal of foreign bodies from the bladder than is the convex cystoscope.

In the female it seldom is so difficult to remove such bodies from the bladder. In them, the Kelly endoscope and the knee-chest position often make it possible to grasp objects with a larger pair of forceps. Herman has suggested for the female the passage of an infant cystoscope and a pair of forceps through the urethra, grasping the foreign body under good visual conditions and withdrawing it after the cystoscope has been removed.

# INDEX

- ABDOMEN, palpation of, in examination of patient, 76  
 rigidity of, in fulminating pyelonephritis, 478  
 Abdominal injuries, vesical rupture and, 443  
 Aberrant vas of Haller, 58  
 Abscess, follicular, 338, 348  
 of prostate gland, 381-384. See also under *Prostatic Abscess*.  
 of renal cortex, spontaneous recovery in, 503  
 of urethra, diverticulum at site of former, 359  
 perinephric, symptoms of, 485  
 Accidental infection in gonorrhea, rarity of, 314  
 Acetic acid for venereal warts, 200, 294  
 in urethral papilloma, danger in use of, 365  
 Acetylsalicylic acid, 246-247  
 Acetyl-beta-methylcholine chloride, 253  
 Acid-ash diet, 267-268  
 calculi in kidney dissolved by, 267  
 in renal calculus, 267, 509  
 Acidification in renal calculus, 509  
 Acidifiers, 249  
 Acriflavine, 84  
 for prophylaxis in gonorrhea, 321  
 for urethral cleansing before indwelling catheterization, 224  
 in urinary retention, 461  
 in gonorrhea, local treatment with, 327  
 in pelvic lavage, 485  
 neutral, antiseptic for cystoscopy with, 577  
 for *Trichomonas vaginalis*, 347  
 in gonorrhea, safe strength of, 199  
*Trichomonas vaginalis* treated with, 199  
 Adenitis, gonorrheal inguinal, acute gonorrhea complicated by, 341  
 inguinal, 297  
 balanoposthitis associated with, 287  
 scrotal edema following, 407  
 Adenocarcinoma of bladder, pedunculated, 627  
 Adenoids, urethral, 361  
 Adolescence, retention of urine in, neurotic background of, 458  
 Aerocystograms of vesical tumors, 456  
 Age, vesical contour changes owing to, 608  
 Aged bladder, 590-591  
 dysuria in, 178  
 in female, 591  
 kidney function changes in, 32  
 Albarran's glands, 52  
 Albumin in urine, 88  
 nitric acid test for, 89  
 Alcohol, indulgence in, gonorrhea aggravated by, 315  
 true chronic gonorrhea caused by, 165  
 Alcoholics, sterility in, 440  
 Alkaline ash diet, 268-269  
 high vitamin, 268  
 urinary alkalization with, 249  
 Alkalinization of urine, in urethral tuberculosis, 358  
 Alkalizers, 249  
 Allergic cystitis, cystoscopy in, 708-710  
 Alum for intertrigo, 413  
 Alupin jelly, preputial retraction aided by, 279  
 Ammoniomagnesium phosphates in urine, stasis indicated by, 94  
 Ammonium benzoate, acidification of urine with, 249  
 chloride, acidification of urine with, 249  
 mandelate, urinary asepsis with, 250  
 Ampulla of vas deferens, function as reservoir for spermatozoa, 65  
 structure, 55  
 Amputation in penile carcinoma, 308  
 Analgesics, 245-248  
 Anatomic association in diagnosis, 405  
 Anesthesia, 277-281  
 caudal, in cystoscopy, 581-582  
 technic of, 279  
 circular, of penis, 278-279  
 in cystoscopy, 581-582  
 for children, 517  
 in meatotomy, 284  
 intravenous, 280-281  
 local, for relief of urinary pain in urethral tuberculosis, 358  
 in cystoscopy, 616  
 infiltration, 278  
 Anorchism, 428  
 Anterior irrigations, 204, 205  
 Anterior-pituitary-like hormones, 275  
 Antomaline in lymphopathia venereum, 303  
 Antiformin method for finding tubercle bacillus in urine, 101

- Antimony, in lymphopathia venereum, 303  
thioglycollate in granuloma inguinale, 301
- Antiseptics, 250-252, 256-262  
in urologic practice proper role of, 258  
kidney function and effectiveness of, 259
- Antispasmodics, 248-249
- Antistertility vitamin, 271 See *Vitamin E*
- Anuria, 175-177  
causes of, classification, 175  
diagnostic procedures in, 176  
in ureteral calculus, operation for, mortality from, 472  
in ureteral colic, 471  
intravenous urography in, contraindications to, 648  
meaning of, 175  
obstructive, 175  
causes of, 175  
prognosis in, 176  
postrenal, 175  
prerenal, 176  
renal, 175  
roentgenogram in, 176  
secretory, 175  
signs of, 176  
treatment of, 177
- Aphrodisiacs in impotence, 538
- Apparatus for irrigation, arrangement of, 202
- Appendixes simulated by pain from right-sided pain in ureteropelvic junction, 169
- Appendix testis, symptoms, 438  
torsion of, 438  
differentiated from epididymus, 438  
treatment, 438
- Applicator, shape of, in rectal diathermy, 231
- d Arsonval current, intravesical lesions fulgurated by, 238
- Arthritis, gonococcal, following meatotomy, 284  
gonorrheal, 341  
following incision of para urethral sinus, 293  
treatment with foreign protein injections, 341  
gonococcal vaccine, 341  
immobilization, 341  
prolonged hyperthermia, 341  
sulfanilamide, 341  
prostatic massage followed by, 378
- Aschheim-Zondek test in testicular neoplasia, 437
- Asepsis in catheter manipulation, 218  
in cystoscopy for residual urine, 615
- Asthenia, uterine compression in, 659
- Astringents in gonorrhea, 378
- Asymptomatic gonococcus carriers, 335
- Atony of bladder, causes, 693
- Atony of bladder, cystoscopy in, 693  
types of, 693
- Autogenous vaccines during course of prostatic massage, 380
- Autohemotherapy, 256
- Autonephrectomy, 472
- Avitaminosis, renal calculus and, 503
- Bacilli, motile, in infected urine, 117
- Bacillus, fusiform, in balanoposthitis, 288
- Back pressure in treatment of prostatic obstruction, danger of, 394  
pin point meatus in causation of, 289  
prolonged, as a cause of coarse trabeculation of bladder, 680  
renal carbuncle from, 501  
function and, 488  
urethral stricture as a cause of, 350
- Bacteria, differentiation of, 117  
in urethral discharges, interpretation of, 106  
morphologic differentiation, 117  
pathogenic, in urethra, 210, 213  
thermal death points of, 229
- Bactericides, 193  
direct injection of, into prostate gland 374  
in anterior urethra, 123  
penile and scrotal sores, syphilis to be ruled out before using, 297
- Bacteriology, urologic rules and exceptions in, 117
- Bacteriuria, 92, 185-186  
causes of, 185  
ketogenic diet in, 186  
prolonged, 477  
stagnation of urine in, 185  
treatment of, 186
- Balanitis, 287  
erosive, 298  
causation of, 299  
diagnosis, 299  
symptoms, 299  
treatment, 299  
gangrenous, 298
- Balanoposthitis, 287  
bacterial flora of, 288  
causes of, 287  
chronic, in etiology of carcinoma of penis, 307  
circumcision in treatment of, 288  
gonorrhea complicated by, 337  
gonorrheal, 288  
prevention of recurrence of, by circumcision, 281  
smears in, 288  
treatment of, 288  
urethral discharge secondary to, 106
- Ballottement in renal palpation, 126

- Bands, congenital, of posterior urethra, 151  
 Barbitol, 248  
 Barbiturates, 248  
   after reaction from, absence of, 248  
 Bedridden patients, cystoscopic position of, 580  
 Belladonna, 248  
   *dosage of*, 249  
   in bladder tenesmus, 179  
   enuresis, 192  
   in children, 248  
 Betanaphthol ointment for scabies, 413  
 Beta-oxybutyric acid, dependence of ketogenic diet upon excretion of, 260  
 Bichloride of mercury, bactericidal use in chancreoid, 297  
   in pubic pediculosis, 411  
 Bierhoff crutches in cystoscopy, 567  
 Bile in urine, 89  
*Bilharzial infestation of urogenital tract*, 72  
 Bilharziasis, vesical, cystoscopy in, 715-717  
   tumor and, 452  
 "Billiard-ball testicle," 430  
 Bipolar current in cystoscopic fulguration, 644  
 Bistoury, incision for meatotomy with, 285  
 Bladder, adenocarcinoma of, pedunculated, 627  
   aged, 590-591  
   cystitis lentiformis in, 671  
   air dilation of, in cystography, 134  
   anatomy of, 38  
   anesthesia in tabes dorsalis, results of, 464  
   atony of, causes, 693  
   cystoscopy in, 693  
   types of, 693  
   "autonomic," in retention of urine, establishment of, 459  
   back-pressure, from poor urinary habits, 158  
   bilharziasis of, cystoscopy in, 715-717  
   blood supply of, 40  
   calculus of, 430-452  
   cystitis in, 451  
   cystoscopy in, 686-692  
   diagnosis, 452  
   etiology, 450-451  
   hematuria in, 451  
   pain in, 451  
   pyuria in, 451  
   symptomatic diagnosis in, 686  
   symptoms, 451-452  
   urinary scasis in, 451  
   capacity, 38  
   measurement of, 149  
   carcinoma of, 453-457  
 Bladder, carcinoma of, cystoscopy in, 627-631  
   mode of attachment to vesical wall, 454  
   pathologic changes of, 628-630  
   terminal bleeding and, 79  
   treatment of, 456-457, 630-631  
   vesical tenesmus as sign of, 178  
*cercaire in*, 716  
 changes during pregnancy, cystoscopy in study of, 603-604  
   in contour of, minor, cystoscopy in, 605-610  
   in uterine displacements, cystoscopy in, 604-605  
   misleading, causes of, 586  
 circulation, 607-608  
 coats of, 38  
 congestive bleeding from, 82  
 contour, prostatic fibrosis and, 594  
 "cord," 461-466. See also under *Bladder*, *neurogenic*.  
 cyst of, prostatism simulated by, 594  
 cystometric types of, 150  
 decompression of, for cystoscopy in retention of urine, 577-578  
 deformity of, cystocele and, 605  
 dilatation of, for cystoscopy, 569-570  
   in ureteral meatoscopy, 634  
 diseases of, 443-465  
 distention, limitation of, by pelvic mass, 172  
 distress in tuberculosis of prostate, 385  
 diverticulum of, 447-450  
   congenital, 448, 681  
   cystographic demonstration of, 134  
   cystography in study of, 682  
   cystoscopy in, 450, 681-683  
   diagnosis, 450  
   etiology, 448-449  
   infection accompanying, 449  
   kinds of, 681  
   location, 448  
   position of, 681  
   predisposing lesions in, 449  
   straining at urination, habitual, and, 448  
   symptoms, 449  
   treatment, 450, 682-683  
     surgical, 450, 683  
 dysfunction, brain tumor and, 464  
 cystometric studies in, value of, 148  
   in vesical neoplasm, 455  
   neurogenic factors influencing, 150  
 edema bulbosum of, 672  
 emptying of, position of catheter in, 220  
 exstrophy of, 466-467  
   epispadias associated with, 466  
   treatment, 466-467  
 foreign bodies in, cystoscopy for, 719-722



Bladder, function, 43 See also under

*Urination*

- mental fixations and 159
- principles of, 171
- fundus of, 40
- gas in, 187
- granuloma of, 627
  - tuberculous, 684
- habit, 171
  - cystoscopy in, 676-679
  - pseudocontracture of, 678
- hemorrhage, submucosal, 672
- hives of, 708
- hyperemia of, cystoscopy in, 669
  - diagnosis, 669
- in fibrosis of prostate gland, cystoscopic appearance of, 594
- infection of, accompanying diverticulum, 449
- infections of, methenamine in, 260
- inflammation of, cystoscopy contraindicated in, 572
  - cystoscopy in, 669-673
  - treatment with guaiacol and calomel 200
  - phenol, 200
- interior surfaces of, division of, 40
- irrigation, boric acid for, 199
  - in gonorrheal posterior urethral infection, 333
  - chyluria, 187
- irritation in mild pyelonephritis, 478
  - sedation of nerve ends in with calceosol, 247
  - urticaria and, 708
- leukoplakia of, causes 712
  - cystoscopy in, 712-713
  - pathology, 713
  - symptoms, 713
  - treatment, 713
- lymphatics of, 40
- malakoplakia of, in male and female, 714
- mucosa, edema of, cystoscopic appearance of, 595
  - in pregnancy, 604
  - rugae of, 590
- neoplasms of, 621-631
  - location of, 672
- nervous mechanism of, 42
- neurogenic, 461-466
  - catheterization in, 465-466
  - etiology, 462-463
  - hypertonicity in, 465
  - incontinence of urine in, 462
  - overdistention and, 462
  - spinal injuries and, 462
  - suprapubic drainage in, 465-466
  - symptoms, 464, 465
  - tabes dorsalis and, 462
  - treatment, 465

- Bladder, neuromuscular imbalance of, in urinary frequency, 171
- normal, 589-591
- obstruction of outlet of See under *Prostatic obstruction*
- outlet, contour of, interpretation of changes in, 593
  - cystoscopic appearance in health and disease, 591-596
  - edema bullosum of, 600
  - nonpathologic mucosal tabs of, in female, 592
  - radial appearance of, 592
- overdistention of, cystoscopy and, 587-588
  - epididymitis caused by, 619
- pain, 169
  - association of, with urination, 169
  - referred along urethra, 169
- papilloma of, 623
  - cystoscopy in, 622-627
  - fulguration of, 644
  - location of, 624, 625
  - malignant change in, 624-625
  - pathology, 623-624
  - prognosis in, 626-627
  - repeated examination after destruction, 626
  - terminal bleeding and, 79
  - treatment, 625-627
- pathology, simulated, causes of, 586
- pressure, maximum voluntary, normal 149
- pseudo atony of, cystoscopy in, 678
- pseudocontracture of, cystoscopy in, 678
- pus in, 81
  - reaction of, to chemical applications, 199
- relaxation of outlet of, during caudal anesthesia, 280
- rupture of, 443-445
  - diagnosis, 444-445
  - roentgenography in, 445
  - etiology factors, 443
  - extravasation of urine in, 444
  - symptoms, 444
  - treatment, 445
- sensation, loss of, 462
- sensitive, in tuberculous cystitis, 685
- spasm, belladonna for relief of, 248
- sphincters, spinal cord lesions producing paralysis of, 172
- straight instruments into, technique of passing 146
- straining to empty, hypertrophy of fascicular bands from, 159
- study of, 586-589
- submucosal hemorrhages of, 672
- symptoms in renal tuberculosis, 500

- Bladder, syphilis of, cystoscopy in, 707-708  
 tenesmus, 178, 179  
   paregoric in, 247  
   pyuria accompanying, 178  
   treatment, 179  
 tolerance of, to silver nitrate, 196  
 trabeculation, causes of, 680  
   cystoscopy in, 679-681  
   in apprehensive patient, 586  
 tuberculosis of, 445-447  
   cystoscopy in, 683-686  
     *contraindication to*, 572  
     reactions to, 575-576  
   pathology of, 683  
   secondary to renal tuberculosis, 445  
   treatment of, 446  
     collargol in, 446-447  
     nearsphenamine, intravenous, in, 446  
     oil of gomenol in, 446  
   vesical syphilis confused with, 707  
 tuberculous, bichloride of mercury irrigation of, 199  
   granuloma of, 446  
   guaiacol in olive oil for, 446  
   irrigations for, abandonment of, 446  
 tumor of, 252-257  
   biopsy to confirm diagnosis of, 455  
   classification of, 453, 455  
   cystoscopy in, 621-631  
   diagnosis, 456  
   etiology, 452  
   hematuria from, 452  
   primary and secondary, differentiated, 453  
   symptoms, 455  
   treatment, 456-457  
   ureteral obstruction from, 455  
 ulcer of, idiopathic chronic, cystoscopy in, 715  
   treatment of, 715  
   variations, normal, 605-606  
 varix of, cystoscopy in, 711-712  
 wall, collapse of, upon withdrawal of cystoscopic fluid, 591  
   mucous membrane of, insensitivity to pain, 169  
   muscular coat of, pain in, 169  
   sensory changes in, neurogenic bladder owing to, 462  
 Bleeding from meatotomy, control of, 285  
   prostatic massage, avoidance of, 241  
   macroscopic, in vesical tumors, 455  
   terminal, vesical carcinoma and, 79  
   vesical papilloma and, 79  
 Blockley bandage, 237  
 Blood, chemical constituents of, normal and pathologic values of, 142  
   chemistry tests of renal function, 140-142  
   Blood clot, evacuation of, for reduction of priapism, 305  
     in bladder, urinary retention from, 460  
     in seminal fluid, 187  
     urine, 79, 92, 181-183  
     regulation of, by kidney, 31  
     supply of bladder, 40  
     of ureter, 36  
 Boric acid as a detergent, 199  
   for bladder irrigation, 199  
 Bougie à boule, 226-227  
   in diagnosis of urethral stricture, 352  
   acorn, 13  
   whalebone filiform, 225  
   woven olive-tipped, 13  
 Bowel as source of renal infections, 476  
 Boyd rectal applicator, 232  
 Brain tumor, bladder dysfunction caused by, 464  
 Bransford Lewis ureteral dilator, 664  
 Brown-Buerger convertible cystoscope, 558, 559, 560  
 Bubo, 302  
 Buerger cysto-urethroscope, 144  
 Bulbocavernosus muscle, 48  
 Bulbomembranous junction, stricture at, endoscopic sign of, 146  
   olivary-tipped catheter to pass, 152  
 Bumpus' method of stone extraction, 665  
 Burning on urination in renal tuberculosis, 498  
   in urethral tumor following tuberculosis, 362  
   urinary acidity and, 86  
 Butterfield cysto-urethroscope, 558, 559  
 CACHEXIA in prostatic sarcoma, 404  
   in renal neoplasm, 514  
 Calcareous deposits in pyonephrosis, open type, 491  
 Calcium carbonate crystals in urine, 94  
   gluconate in cystitis haemorrhagica to check bleeding, 706  
   in epididymitis, 415  
   in gonorrheal epididymitis, 340  
   in kidney rupture, 518  
 ovalate calculus, 687  
   crystals as a sign of calculi, 79  
   in urine, 183  
     pathologic significance of, 95  
   phosphate calculi, 687  
   in urine, 184  
   crystals in urine, 94  
     during nervous stress, 94  
     of gonorrheal patients, 94  
   surface of renal subepithelium, 504-505  
 Calcareous, 247  
   tablets in pseudomembranous trigonitis to reduce symptoms, 696

- Calculi, calcium oxalate crystals and, 79  
 differentiation of, by color, 690-691  
 of kidney, bilateral, 654  
 recurrence of, checking for, 691  
 ureters obstructed bilaterally by, anuria due to, 175
- Calculus formed in urethra, 360  
 in renal cortex, 505  
 in ureter as a cause of testicular neuralgia, 431  
 of bladder, 450-452  
   cystitis in, 451  
   cystoscopy in, 686-692  
   diagnosis, 452  
   differentiation from tumor, 687  
   etiology, 450-451  
   hematuria in, 451  
   pain in, 451  
   pyuria in, 451  
   symptomatic diagnosis in, 686  
   symptoms, 451-452  
   tenesmus as a sign of, 178  
   urinary stasis in, 451
- of kidney, 503-510  
   acidification of, 509  
   bilateral, 654  
   diagnosis, 509  
   diet in, 509  
   etiology, 503-505  
   hematuria in, 508  
   hyperparathyroidism and, 505  
   operative removal of, 505-510  
   pain in, 507-508  
   pathology, 505-507  
   polyuria in, 175  
   pyuria in, 508  
   suppression of urine in, 508  
   symptoms, 507-508  
   treatment, 509-510  
     sulfonamides in, 262  
   uremia in, 506  
   urinary frequency in, 508
- of prostate gland, 386  
   fulguration of postmontane fossa, 386
- of ureter, 469-472  
   cystoscopic evidences of, 633  
   cystoscopy in, 660-667  
   descent of, assistance with dilatation, 664  
   diagnosis, 471  
   lodgment of, 471  
   operation for anuria in, 472  
   pain in, 469-470  
   passage of, without instrumental aid, 472  
   roentgenography in, 660-667  
   symptoms, 469-470  
   treatment, 471-472  
     cystoscopy in, 662-667
- of urethra, 360-361
- Calculus of urethra, analysis of, to determine physiologic faults, 361  
   diagnosis, 360  
     roentgenography in, 360  
   symptoms, 360  
   treatment, 360-361  
   removal of, technic of, 688-692  
   spontaneous delivery of, 665-666  
   stagnation of urine leading to formation of, 391
- Calomel and guaiacol for inflamed bladder, 200  
   ointment, prophylaxis in syphilis with, 321
- Cantharis, incontinence of urine following administration of, 174  
   oral administration of, priapism resulting from, 305
- Carbolfuchsin for chancroid ulcerations, 200  
   in staining for tubercle bacillus, 103  
   preparation of, 11
- Carbuncle of kidney, 476, 500-503  
   diagnosis, 502  
   multiple, 501  
   pathology, 501-502  
   pyelography in, 502  
   sexual incidence of, 501  
   skin infection and, interval between, 501  
   treatment, 503
- Carcinoma, elongation of urethra and, 153  
   embryonal, of testes, 434  
   of bladder, cystoscopy in, 627-631  
     pathologic changes of, 628-630  
     terminal bleeding and, 79  
   treatment of, 456-457, 630-631  
   tenesmus as sign of, 178  
   of kidney, papillary, 512  
   of penis, 307-308  
     diagnosis, 307  
     etiology, 307  
     phimosis in etiology of, 290, 307  
     symptoms, 307  
     treatment, 308
- of prostate gland, 399-403  
     acute fulminating, 400  
     clinical course, 400-401  
     cystoscopic recognition of, 585  
     diagnosis, 401-402  
     disseminating, 400  
     etiology, 399  
     fatality in, 398  
     metastasis in, 400  
     pathology, 399-401  
     scirrhous, 400  
     site of, 399  
     symptoms, 401  
     treatment, 402-403  
       palliative measures in, 403

- Carcinoma of prostate gland, treatment,  
   roentgenography in, 403  
   surgical, 402  
   tuberculosis differentiated from, 385  
 of testes, embryonal, 434  
 of ureter, 473  
 papillary, 629  
 urethral sound in, danger of, 212  
 vesical, mode of attachment to bladder  
   wall, 454  
   terminal bleeding and, 79  
 Carcinomata, sessile characteristics of, 628  
 Cardioresnal failure, scrotal edema in, 407  
 Cardiovascular considerations in relief of  
   urinary retention, 353  
 Carriers, gonococcus, 335  
 Catharsis in pyelonephritis, 481  
 Catheter, asepsis in manipulation of, 218  
   contamination in pyuria, 180  
   double-elbowed, 75  
   in median prostatic lobe obstruction,  
     220  
   elbowed, advantage of, 217  
   fastening in bladder, method of, 221  
   Gouley tunneled, 14  
   in ureter, passage of, obstructions to,  
     636  
   in urinary retention, choice of, 353  
   indwelling, 221-224  
     changing, frequency of, 224  
     choice of, 223  
     effects on bladder mucosa, 673  
     in bulbomembranous stricture, 152  
     proper location in bladder of, 221  
     ureteral, hospitalization for, 663  
 Malecot, 17  
 obstruction to, points of, 217  
 olive-tipped, bulbomembranous stric-  
   ture passed with, 152  
 overcurved, in median prostatic lobe  
   obstruction, 220  
 Pezzar, 17  
 Phillips, 15  
   in strictures, 217  
 mucosal reaction to, 222  
 plug, glass, 223  
 retention in urethra, method of, 223  
 single-elbowed, 16  
   in median prostatic lobe obstruction,  
     219  
 size of, choice influenced by urethral  
   meatus, 217  
 soft rubber, 217  
 straight, 16  
 technic of passing, 146, 217-220  
 urethral, types of, 568-569  
 whistle-tip, 569  
 Catheterization in hematuria prior to cys-  
   tосcopy, 181  
   in neurogenic bladder, 465-466  
 Catheterization in prostatic obstruction, 393  
   in vesical rupture, 445  
   intermittent and indwelling, choice be-  
     tween, 222  
   of ureter, cystoscopy and, 634-638  
   of well kidney in differential phthalein  
     test, 642-643  
   ureteral, in diagnosis of pyelitis, 485  
     in treatment of anuria, 177  
   vesical distention in congenital valves  
     relieved by, 367  
 Caudal anesthesia in cystoscopy, 581-582  
   technic of, 279  
 Cautey circumcision, 283  
   in phimosis, 290  
 Cells, embryonal, tumors originating in,  
   434  
 Cellular changes due to frequent urethral  
   instrumentation, 217  
   susceptibility to gonococcus, 312  
 Cercariae in bladder, 716  
 Chancre, differentiation from chancroid,  
   295  
   from penile tuberculosis, 309  
   of urethra, 366  
   postcoronal, 296  
 Chancroid, 295-298  
   circumcision in, 297  
   differentiation from chancre, 295  
   Ducrey's bacillus in, 296  
   incubation period of, 295  
   prophylaxis for, 297  
   symptoms of, 297  
   syphilis complicating, 295  
   treatment, 297-298  
     carbolfuchsin in, 200  
     copper sulfate, 200  
     fulguration in, 238  
     high frequency electricity, 297  
     procedure in, 298  
     when complicated by phimosis, 297  
   venereal nature of, 296  
 Chemical constituents of blood, normal  
   and pathologic values, 142  
   irritation of anterior urethra, prolonged,  
     smear indicative of, 105  
 Childbirth, retention of urine following,  
   461  
 Children, cystoscopy in, anesthesia for,  
   577  
   cysto-urethroscope for, Butterfield, 558,  
     559  
   enuresis in, 191  
 Chill, urethral, 210  
 "Chimney-sweep's cancer." See *Epitheli-  
   oma of scrotum*.  
 Chordee, induration of corpus spongi-  
   osum leading to, 62  
   penile fracture from efforts to break,  
     306

- Chyle in urine, 90  
 Chylocele, diagnosis of, 420-421  
 Chyluria, 186-187  
   causes of, 186  
   diagnosis of, 186  
   diet in, 187  
   *Filaria sanguinis hominis* in, 90  
   onset of, 186  
   prognosis of, 187  
   signs of, 186  
   treatment of, 187  
 Circulation, urethral, 607-608  
   vesical, 607-608  
 Circumcision, 281-283  
   anesthesia in, 281  
   cautery, 283  
   in erosive balanitis, 299  
   dorsal or lateral slits in, 283  
   errors in, common, 281-283  
   in balanoposthitis, 288  
   in chancroid, 297  
   incision methods, diagram of, 282  
   indication for, 281  
   military dressing in, 283  
   preventive, for penile pathology, 289  
   tuberculosis of penis following, 308  
 Coca solution, preputial retraction aided by, 279  
 Cocaine in cystoscopy, 582  
 Codeme, 247  
   cystoscopy preceded by injection of, 578  
   in bladder tenesmus, 179  
   in gonorrheal posterior urethral infection, 333  
 Coffee ground urine, 181  
 Coitus, duration of, 541-542  
   interruptus, 547-548  
   prolongatus, 548-550  
   cystoscopic evidence of, 596, 609-610  
   urethritis following, 346  
 Cold, external, general rules of application of, 228  
   treatment with, 227-234  
 Colic, renal. See *Colic, ureteral*  
   ureteral, 469  
   from calculus, course of pain in, 168  
   in acute prolonged pyelonephritis, 478  
   in renal rupture, 516  
   in renal tuberculosis, 499  
   pyelitis preceded by, 484  
 Collargol in pelvic lavage, 485  
   in tuberculosis of bladder, 446-447  
 Colliculus, 45  
 Colon bacilli in urethral discharge, meaning of, 107  
   source of, 186  
   bacilluria, etiology of, 185-186  
   bacillus, bacteriuria caused by, 185  
   in pyelonephritis, 477  
 Colon bacillus in urogenital tract, significance of, 121, 122  
 Color memory in indigo carmine test, 641  
 Complexes, mental, 164  
 Compressor urethrae, 45, 46  
   contraction of, mistaken for obstruction, 152  
   in acute urinary retention, role of, 458  
 Condom for prophylaxis in gonorrhea, 321  
   specimen, amotile sperms in, significance of, 439  
   unreliability for semen examination, 115  
 Congenital bands of posterior urethra, diagnosis of, 151  
   diverticulum of bladders, 448  
   structure of anterior urethra, 151  
   valves of urethra, 151, 367-368  
   hydronephrosis due to, 486  
 Constipation in chronic vesical distention, 592  
   ovaturia due to, 183  
 Continence, sexual, 554-556  
 Copper sulfate solution for chancroid, 298  
 Cord' bladder, 461-466. See also under *Neurogenic bladder*  
   suspicion of, in apprehensive patient, 586  
 Corpora amylacea in prostatic secretion, 112  
   cavernosa, 61  
   interdependence of, 60  
 Corpus spongiosum, 48  
   structure of, 61  
 Cowper's duct, cyst of, 370  
   glands, 64  
   abscess of, gonorrhea complicated by, 338, 339  
   diseases of, 369-370  
   extension into corpus spongiosum, 62  
   gonococcal feeders for anterior urethra, 244  
   massage of, 244  
   intervals in, 244  
   palpation of, 129, 130  
   tuberculosis of, 369  
   diagnosis, 370  
   symptoms, 370  
   treatment, 370  
   urethra in relation to, 48  
 Cowperitis, acute, 369  
   treatment, 369  
   chronic, 369  
   urethral stricture leading to exacerbations of, 369  
 Crab-louse, 411  
 Crabtree method for finding tubercle bacillus in urine, 101

- Creatinine in blood, kidney function tested by, 142  
retention, prognostic value of, 142
- Crura of penis, 60
- Cryptorchidism, 274-275  
hormonal treatment of, 274  
neoplasm in presence of, 435  
spontaneous correction of, 274  
testosterone in, 275
- Crypts of Morgagni, 48
- Crystals, urinary, 93-97
- Culture, female urogenital, obtaining, 124  
precautions in urogenital tract, 123
- Curettement in incrustrated cystitis, 704
- Current, street, objections to, 563  
supply of, for cystoscopic illumination, 562-563
- Curvature of penis due to plastic penitis, 304
- Cut-off muscle. See *Compressor urethrae*.
- Cyst of posterior urethra, 361  
of Cowper's duct, 370  
of kidney, 524-525  
diagnosis, 524-525  
symptoms, 524  
treatment, 525  
of posterior urethra, endoscope in study for, 147  
of scrotal skin, 407  
of urethra, tubercle bacilli in, 361  
retention, 595
- Cystitis, acute, cystoscopy in, 673-675  
generalized, 675  
allergic, cystoscopy in, 709-710  
basal, from prostatic infection, 674  
chronic, cystoscopy in, 675-676  
squamous epithelium in urine indicating, 78  
vesical tumor and, 452  
cystica, 671, 672  
cystoscopy in, 717  
cystoscopic appearance of bladder in, 670  
cystoscopy in, 669-673  
reactions to, 574-575  
emphysematosa, cystoscopy in, 710-711  
treatment, 711  
gonorrhoea, cystoscopy in, 706-707  
cystoscopy in, contraindication to, 706
- Cystitis haemorrhagica, bleeding in, calcium gluconate to stop, 706  
cystoscopy in, 704-706  
pernicious anemia and, 704  
in chronic pyelonephritis, 480  
in renal tuberculosis, incidence of, 494  
in vesical calculus, 451  
incrustrated, cystoscopy in, 701-704  
diagnosis, 703  
etiology, 702  
pathology, 702-703
- Cystitis, incrustrated, symptoms, 703  
treatment, 703-704  
curettement in, 704  
phosphoric acid solution in, 704
- lentiformis, in aged bladder, 671
- panmural, bladder pain in, 169
- cystoscopy in, 697-701  
etiology, 697-698  
in vesical inflammation, 672  
lesions of, 699  
symptoms, 698  
treatment, 700-701  
with oil of gomenol, 200  
vesical tenesmus as sign of, 178
- staphylococcic, cystoscopy in, 718-719
- subacute, cystoscopy in, 675-676
- tuberculous, cystoscopy in, 683-686  
pathology, 683
- Cystocele, bladder deformity and, 605
- Cystography, 133-136
- Cystometers, 148
- Cystometric studies in bladder dysfunction, value of, 148
- Cystometry, 147  
technic of, 148
- Cystoscope, 557-567  
American made, advantages of, 557  
Brown-Buerger convertible, 558, 559, 560  
concave, in female, advantage of, 558-559  
convex fluid-dilating type of, 144  
in male, advantage of, 559  
foreoblique, 560  
indirect and direct, 558  
irrigating, 570  
lamps, care of, 563-564  
passage of, 582-586  
in prostatic hypertrophy, 616  
single catheterizing, 558  
sterilization of, 561-562  
straight, passage of, 585-586  
Wappler operating, 558  
wiring mechanism of, 564
- Cystoscopic appearance of posterior urethra in health and disease, 597-601  
equipment, 557-558  
forceps, 561  
fulguration, 644-646  
treatment periods in, 645  
rongeur, Young's, 559
- Cystoscopist, 555-557
- Cystoscopy, 79, 555-577  
acridavine in antiseptics for, 577  
anesthesia in, 581-582  
caudal, 581-582  
local, 616  
cocaine in, 582  
codeine injection preliminary to, 578  
contraindications to, 572-574  
in gonorrhoeal urethritides, 706

- Cystoscopy, current supply for illumination in, 562-563  
 dilatation of bladder for, 569-570  
 during hemorrhage, 611  
 evipal in, intravenous, 582  
 for foreign bodies in bladder, 719-722  
 for residual urine, asepsis in, 615  
 illumination in, adjustment of, 563-564  
 in allergic cystitis, 708-710  
 in bedridden patients, position for, 580  
 in bilharziasis, 715-717  
 in bladder changes during pregnancy, 603-604  
   with uterine displacement, 604-605  
   contour changes, 605-610  
 in bleeding, 610-612  
 in children, anesthesia for, 577  
 in congenital urethral valves, 367  
 in congestion of posterior urethra, 574  
 in cystitis, 574-575, 669-673  
   acute, 673-675  
   chronic, 675-676  
   cystica, 717  
   emphysematosa, 710-711  
   gonorrhoeica, 706-707  
   hemorrhagica, 704-706  
   subacute, 675-676  
 in diverticulum of bladder, 450  
 in endometrioma of bladder, 719  
 in female, position for, 581  
 in foreign body removal from bladder, 719-722  
 in gonococcal infection, 599  
 in gonorrheal cystitis, 706-707  
 in habit bladder, 676-679  
   pseudo atony of bladder, 678  
   trabeculation, 677-678  
 in hematuria, 183, 571, 574, 610-612  
 in hydronephrosis, 489  
 in incrusted cystitis, 701-704  
 in kidney function tests, 640-643  
   rupture, 517  
 leukoplakia, 712-713  
 in lumbar lordosis, position for, 580  
 in malakoplakia, 714-715  
 in median bar, 612-614  
 in panmural cystitis, 697-701  
 in prostatic carcinoma, 631  
   hypertrophy, 614-621  
     contraindications to, 573  
     hemorrhage from trauma in, 615  
     reactions to, 576-577  
   obstruction, 393-394  
 in pseudocontracture of bladder, 678  
 in pulmonary tuberculosis, contraindications to, 573  
 in pyonephrosis, 492  
 in pyuria, 179, 571  
 in renal calculus, 509  
 in residual urine, 615  
 Cystoscopy in residual urine, reactions to, 576  
   in retention of urine, vesical decompression for, 577-578  
   in staphylococcal cystitis, 718-719  
   in syphilis of bladder, 707-708  
   in toxemia, contraindications to, 574  
   in trigonitis, 693-697  
   in tuberculous cystitis, 683-686  
   in ulcer of bladder, 715  
   in upper urinary tract infections, 638-640  
 in ureteral calculus, 471-472, 660-667  
   infection in, 663  
   meatotomy, 631-634  
   stricture, 667-668  
 in ureterocele, 692  
 in urinary retention, 614  
 in varix of bladder, 711-712  
 in vesical calculus, 452, 686-692  
   diverticula, 681-683  
   hyperemia, 669  
   inflammation, 669-673  
     contraindications to, 572  
   trabeculation, 679-681  
   tuberculosis, contraindications to, 572  
     reactions to, 575-576  
   tumor, 621-631  
 indications for, 570-571  
 knee chest position in, 580  
 leg holders in, 578-579  
 methenamine in preparation for, 577  
 morphine injection preliminary to, 578  
 muscular tension in, median bar simulated by, 596  
 operative choice based upon, 615  
 position of patient for, 144, 578-581  
 preparation of patient for, 577  
 procedures in, 577-646  
 prolonged, 200  
   oil of gomenol following, 200  
 reactions to, 574-577  
 residual urine, withdrawal during, 587  
 sacral nerve block in, 582  
 systemic factors in, 572  
 tables for, 567-568  
 traumatic, reactions to, 574  
 Trendelenburg position in, 581  
 ureteral orifices located by, 601-603  
 vesical overdistention in, 587-588  
 Cystostomy, suprapubic, in pyelonephritis, 487  
 Cysto-urethroscope, Buerger, 144  
   Butterfield double catheterizing, 558, 559  
   McCarthy, 144  
   straglit, in prostatic hypertrophy, 616  
 Cysto-urethrosopic study in diagnosis of urethral tumor, 362  
 Cysto-urethroscopy in urethral diverticulum, 359

- Cysto-urethroscopy in congenital bands or valves, 151  
 Cysts, retention, 595
- DARK-ADAPTATION test for vitamin A deficiency, 271  
     in vesical leukoplakia, 713
- Dark-field examinations, 153  
     in chancroid, 295  
     study for differentiating chancre from penile tuberculosis, 309  
     in urethral chancre, 366  
     technic of, 154
- Decapsulation and denervation, renal, in treatment of anuria, 177  
     renal, in pyelonephritis, 482
- Deformity of bladder, cystocele and, 605  
     of penis from follicular abscess, 338
- Dermatitis after sulfur application, calamine lotion for, 413
- Descensitization of remote areas by prostatic massage, 240  
     to foreign proteins, 239
- Desiccation, electric. See *Fulguration, surface*.
- Detrusor muscles, 38  
     action of, in urination, 43  
     hyperfunction of, obstructive factors leading to, 150  
     neuromuscular behavior of, in urination, 150
- Developmental deficiencies, hormonal therapy for, 274
- Diabetes mellitus, yeast cells in urine and, 90
- Diagnostic methods, general, 125-154  
     urology, trends in, 257
- Diathermy, medical, in gonorrheal epididymitis, 340  
     of subvesical structures, 233  
     prostatic, *Trichomonas vaginalis* treated with, 347  
     gonococci in secretion despite, 229  
     subvesical, care in use of, 230  
     surgical. See *Fulguration, surface*.
- Diet, 263-272  
     acid ash, high vitamin, 267  
     alkaline ash, high vitamin, 268  
     effect upon course of gonorrhea, 327  
     high vitamin acid ash, 267-268  
     high vitamin alkaline ash, 268-269  
     in oxaluria, 269  
     in phosphaturia, 269  
     in renal calculus, 509  
     ketogenic, 260  
         elaborate, 263-265  
         in pyelitis, 485  
         low calory, 266-267  
         simplified, 265-266
- Difco, cultural study with, 119
- Differential phthalein test, normal appearance time in, 643  
     normal output in, 643
- Digital fossa, 56
- Dilatation of bladder for cystoscopy, 569-570  
     of urethra in urethral calculus, 360  
     in urethral tuberculosis, 358
- Dilator, Kollmann, 13  
     ureteral, 664
- Diothane anesthesia, 277
- Diphtheroids in urethral discharge, meaning of, 107
- Direct smear, advantages of, for diagnosis, 98
- Dislocation of penis, 306
- Distal sphincter. See *Compressor urethrae*.
- Disulon, 252
- Diuresis, anuria treated with, 177  
     treatment, 682-683
- Diverticulectomy, 683
- Diverticulum of bladder, 447-450  
     congenital, 448, 681  
     cystoscopy in, 450, 681-683  
     diagnosis, 450  
     etiology, 448-449  
     inclusion in hernial sac, 449  
     infection associated with, 449  
     kinds of, 681  
     location of, 448, 680  
     predisposing lesions in, 449  
     residual urine in, 153  
     straining at urination, habitual, and, 448  
     symptoms, 449  
     treatment, 450  
     treatment, surgical, indications for, 450, 683  
     vesical tumor and, 452
- of urethra, 358-359  
     diagnosis, 359  
     operative treatment of, 359  
     treatment, 359
- Donovan bodies, 300
- Dorsal or lateral slits in circumcision, 283
- Douchmashkin tunneled dilators, 664
- Drainage as principal factor in cure of pyuria, 181  
     in urogenital infection, 66, 67  
     of prostate gland, poor, clumps of leukocytes as evidence of, 112  
     poor, pus in urine as sign of, 180
- Dressing, adhesive, for serotal support and pressure, 235
- Dribbling after urination caused by faulty habit, 160  
     in urination, 390
- Drugs, stimulating, meaning of, 195
- Dry electric heat for chancroid, 298  
     lens method in dark-field study, 154



- Ducrey's bacillus*, 296  
 absence of, in penile tuberculosis, 309
- Dysuria*, 177, 178  
 ageing bladder as origin of, 178  
 causes of, 177  
 effects of, 178  
 meaning of, 177  
 neurogenic causes of, 177  
 tabes and, 178
- Echinomycosis* in hemorrhagic cystitis, 705
- Ectopic testes*, positions of, 432
- Edema bulbosum* of bladder, 672  
 of bladder in cystitis, 671  
 of scrotum, 407-408  
 treatment, 408  
 of ureteral outlet, 633  
 of ureteral ridge, 633, 662  
 of vesical outlet, 600
- Eisner psychrophore*, 232, 233
- Ejaculation*, failure of, 543-544  
 spinal cord lesions causing, 543  
 premature, 541-544
- Ejaculatory duct*, 53
- Electric excision*, 397, 398  
 in carcinoma of prostate gland, 403
- Electrode*, placing of, in cystoscopic fulguration, 645  
 vacuum, for fulguration of chaneroid, 238
- Elephantiasis* of penis in lymphopathia venereum, 302  
 of scrotum, 409  
 etiology, 409
- Emissions*, seminal, involuntary, 544-547  
 posterior urethral pathology and, 532, 533  
 silver nitrate for, 546  
 treatment, 546
- Emphysematous cystitis*, cystoscopy in 710-711
- Endocrine glands*, 272-276  
 in urology, 272  
 sexual performance and, 330
- Endometrioma*, vesical, cystoscopy in, 719
- Endoscope*, 561 See also *Cystoscope* and *Urethroscope*  
 introduction of, into posterior urethra, 145  
 simple tubular, dangers and limitations of, 147
- Endotoxin* of gonococci, 313, 314
- Enucleation* in prostatic hypertrophy, 397
- Enuresis* in children, 191  
 treatment with belladonna, 248  
 prognosis of, 192  
 psychoneurogenic, 191  
 treatment, 192  
 spina bifida associated with, 192
- Enuresis*, thyroid insufficiency in, 192  
 treatment of, 192  
 urogenital lesions in causation of, 191
- Eosinophils* in urethral smears, 104
- Epididymal mass*, rupture of, 417
- Epididymectomy*, 418
- Epididymis*, appendix of, 58  
 cyst of. See *Spermatocele*  
 structure of, 56  
 swelling of, as symptom of gonorrheal epididymitis, 340  
 tuberculosis of, 416-417  
 tuberculous, surgical removal of, 418  
 urine forced into, as cause of epididymitis, 414
- Epididymitis*, antituberc therapy as test before surgery in, 419  
 cystoscopy causing, in cystitis gonorrhoea, 706  
 differentiated from torsion of appendix testis, 438  
 differentiation between nonspecific and gonorrheal, 415  
 gonorrheal, 340-341  
 acute hydrocele associated with, 421  
 fever in, 340  
 scrotal support in, 340  
 symptoms, 340  
 treatment, 340  
 ureteral block as symptom of, 340  
 nonspecific, 414-415  
 diagnosis, 415  
 etiology, 414  
 pathology, 414  
 percentage of cases, 414  
 symptoms, 415  
 palpation precipitating, 231  
 postcystoscopic, from overdistention, 570  
 preventive measures in, 415  
 symptomatic urethral stricture indicated in, 352  
 syphilitic, 418-420  
 diagnosis, 419-420  
 pathology, 419  
 symptoms, 419  
 treatment, 420  
 treatment, 415-416  
 tuberculous, 416-418  
 diagnosis, 417  
 etiology, 416  
 treatment, 417-418  
 types of infection in, 416-417  
 vesical overdistention causing, 619
- Epididymovasostomy* for atresia causing sterility, 441
- Epididymo-orchitis*, tuberculous, simulating testicular neoplasm, 436
- Epispadias*, 287, 311-312  
 complete, exstrophy of bladder associated with, 466

- Epispadias in an infant, 311  
*treatment of*, 312
- Epithelial shreds in urine, nature and significance of, 108  
 surfaces, irritative influences upon, 68  
 susceptibility of, to infection, 68, 69
- Epithelioma of scrotum, 409-412  
 diagnosis, 410-411  
 pathology, 410  
 treatment, 411
- Epithelium, desquamation of, urethral discharge and, 346
- Equipment, 10-22:  
 bougies, 12  
 catheters, 15  
 colorimeters, 19  
 dilators, 13  
 filiforms, 14  
 hydrogen-ion comparators, 19  
 injection bottles, 22  
 injection outfits for patients, 23  
 irrigating nozzle, 22  
 tank, 21  
 massage finger cot, 18  
 microscope, 10  
 sounds, 12  
 stains and solutions, 10  
 storage cabinet, 19  
 syringes, 17
- Erectile tissue, composition of, 60
- Erection of penis, mechanism of, 61
- Erythrocytes in prostatic secretion following massage, 114
- Escherichia coli, mandelic acid for infections by, 261
- Ethyl chloride anesthesia, 278
- Evipal, intravenous, in cystoscopy, 582
- Examination of patient, 75  
 time of, 75
- Exfoliation, mucosal, in hemorrhagic cystitis, 705
- Exstrophy of bladder, 466-467  
 epispadias associated with, 466  
 treatment, 466-467
- Exton's test for albumin in urine, 89
- Extrarenal excretion in treatment of anuria, 177
- Extravasation of urine in vesical rupture, 444
- Eye reactions to prostatic massage, 241, 378
- FALSE passages in urethra, instruments causing, 355
- Fascia of Denonvilliers, 53, 64
- Fasciae of external genitalia, 64  
 perirenal, 26, 64
- Fascicular bands, hypertrophy of, from straining at urination, 159
- Fat in urine, reasons for, 186  
 perirenal, 26
- Fehling test, Benedict's modification of, 87
- Female, bladder of, with children, 590  
 cystoscopy in, position of, 581
- Fever following urethral instrumentation, 210  
 in gonorrheal epididymitis, 340  
 in seminal vesiculitis, 406
- Fibrolipomatous changes in pyonephrosis, 491
- Fibrosis of kidney in pyelonephritis, 477  
 of prostate gland, bladder appearance in, 594
- Filrotic bar, prostatic obstructions due to, 388
- Filaria bancrofti in chyluria, 186
- Filaria sanguinis hominis in chyluria, 90
- Filiform broken off in bladder, removal of, 226  
 in urethral stricture, 354  
 passing of, 353  
 manipulation of, 225  
 use of, 224-227
- Fimbriae in voided urine, papilloma indicated by, 456
- Finsen light therapy in penile tuberculosis, 309
- Fistula, rectovesical, vesical opening of, 675  
 urinary, 349
- Fixations, mental, upon prostate gland, 164
- Flail-joint condition of penis, 61
- "Floating" kidney, 518
- Flush-tank symptom in hydronephrosis, 489  
 in vesical diverticulum, significance of, 449
- Focal infection involving kidney, 475  
 prostatic secretion in, study of, 110  
 ureteral stricture and, 668  
 infective prostatitis, thermal treatment of, 230  
 symptoms, lapse of time between onset, and prostatic study of, 377  
 prostatic infection in, incidence of, 376  
 triad, 373
- Follicles, sebaceous, in penile skin, 63
- Follicular abscess, deformity due to, 338  
 gonorrhea complicated by, 338  
 opening of, need for early, 338  
 stricture of urethra following, 348
- Forceps, cystoscopic, 561
- Foreign bodies in bladder, cystoscopy for, 719-722  
 proteins, desensitization to, 239  
 in gonorrheal arthritis, 341  
 injections, value of, 255
- Forcoblque cystoscope, 560

- Formalin, liberation of, by methenamine, 250  
 sterilization of cystoscopes, 562
- Fossa navicularis, 48  
 pain from posterior urethral disease referred to, 169  
 ulcerations of, in urethral chancre, 366  
 renal, shallow, as cause of nephroptosis, 519
- Fountain, position of, in irrigations for various purposes, 202
- Fracture of penis, 306
- Frei test, 303
- Frenum, chancroids about, 298  
 ligation of vessels at, after circumcision, 283
- Frequency of urination caused by limitation of bladder distention by pelvic mass, 172  
 etiology of, 170  
 importance as symptom, 170  
 in vesical calculus, 451  
 intrinsic causes, 173  
 neurogenic, 172  
 opium suppositories for relief of, 248  
 petechial spinal cord lesions causing, 172  
 psychic factors in, 171  
 psychotherapy for, 159  
 urinary acidity and, 86
- Friedlander bacillus, 300
- Fuadin, dosage, table of, 301
- in granuloma inguinale*, 301
- Fulguration, avoidance of, during vesical dilatation with mineral oil, 612  
 copper sulfate, chancroidal ulcerations treated by, 200  
 cystoscopic, 644-646  
 treatment periods in, 645  
 in congenital valves of urethra, 368  
 in panmural cystitis, 700  
 in pseudomembranous trigonitis, 694  
 in ureterocele, 692  
 in urethral cysts, 546  
 in vesical endometrioma, 719  
 of median lobe, 620  
 of postmontane fossa in prostatic calculus, 386  
 of urethral cysts, 546  
 of urethral poly p., 364  
 of urethral tumor, 362  
 of verumontanum, 601  
 of vesical papilloma, 625-626, 644  
 of vesical tumor, 456  
*surface*, 238  
 anesthesia in, 238
- Fulgurations, intervals between, 626
- Functional aberrations, pathologic changes developed from, 163
- GALACTOCELE, 426
- Gangrene of scrotum, 408-409  
 etiology, 408  
 symptoms, 408-409  
 thrombophlebitis as a cause of, 408  
 treatment, 409
- Garceau catheter, 569  
 for ureteral dilatation, 664  
 in differential phthalein test, 642
- Gas bacillus, stricture of urethra from, mortality in, 351  
 in bladder, 187
- Gastro intestinal symptoms in fulminating pyelonephritis, 478  
 tract in focal infective prostatitis, 377
- Geisinger urethroscope, 144
- Genital system, physiology of, 64  
 tuberculosis, first focus in, 384  
 prostatic involvement in, incidence of, 384
- Genitalia, examination of, 75  
 external, palpation of, 128
- Gentian violet in chancroid, 299  
 in chancroidal ulcerations, 200
- Glands of Littre, 48  
 sublingual, 52
- Glans penis, corpus spongiosum continued as, 48  
 destruction of, in erosive balanitis, 299  
 induration of, search for, in urethritis, 346  
 inflammation of. See under *Balanitis* and *Balanoposthitis*  
 nerve tissue in, 62  
 orgasm without, 62  
 papilloma of, 293  
 treatment, 294  
 Tyson's glands in, 62
- Globus major, 56  
 epididymal swelling in, 419  
 minor, 56
- Golf hole' ureteral orifice in renal tuberculosis, 685
- Gomenol, oil of, as sedative for inflamed bladder mucous membrane, 200  
 for tuberculous bladder, 446  
 in panmural cystitis, 200  
 prolonged cystoscopy followed by injection of, 200
- Gonadogen, 276
- Gonadotropic substances in prostatic hypertrophy, 276
- Gonococcal discharge, cytologic interpretation of, 107  
 infection, cystoscopic evidence of, 599  
*occlusion of lumen of vas deferens* by, 55  
 para urethral sinusitis and, 294  
 sinus pocularis in, 599  
 staining methods in study of, 97

- Gonococcal infection, testicle, inflammation of, involved in, 428  
 two-glass test in, 82  
 urethral tumor following, 362  
 toxin, injection of, lack of value in, 254  
 urethritis, irrigation for, position of fountain in, 202  
 urethrocystitis in women, 706  
 vaccine in gonorrheal arthritis, 341
- Gonococci, colonization of, in hypospadias, 310  
 cultural studies of, oxydase test in, 119  
 extracellularly and intracellularly located, 313  
 submucosal penetration of, 372
- Gonococcus, 312-313  
 carriers, asymptomatic, 322, 335  
 differentiation of, from other *Neisseriae*, 312  
 location of, typical, 117  
 persistence of, reasons for, 342  
 thermal death-point of, 229
- Gonorrhea, 312-335  
 acute, complications of, 335-341  
   high-pressure injections and irrigations as causes of, 336  
 age incidence of, 375  
 anterior urethral, hydrostatic pressure in irrigation for, 203  
 asymptomatic carriers of, 322, 335  
 chronic, 333, 341-343  
   *couperitis* suspected after, 369  
   delineation of, 341-342  
   rarity of, 165  
   *sex-indulgence* causing, 165  
   treatment of, 342  
     local, clinical response to, 327  
     results in, clinical interpretation of, 327  
 course of, 316-319  
   two-glass test to follow, 316-319  
 cures of, percentages in dispensary patients, 325  
   in office patients, 325  
 diet, effect upon course of, 327  
 differentiation from nonspecific urethritis, 343  
 fear of, urogenital psychoneurosis caused by, 165  
 immunity in, 254, 314  
 incorrect diagnosis of, 98  
 incubation period of, 314  
 local treatment, chemicals used in, 327  
   injection method preferred in, 328  
   two-glass test to determine progress of, 326  
 neosilvol in, inferior effect of, 198  
 oral medication in, 327  
 pathology of, 313-314
- Gonorrhea, posterior urethral involvement in, 331-333  
 prophylaxis for, 320-321  
   strong protein silver in, 198  
 psychogenic symptoms of, 163  
 quiescent period with sulfonamides, 334  
 self-treatment of, duration and intervals of, 329, 330  
   strong protein silver in, 329  
 sites of infection with, 320  
 sitz bath in, 228  
 sulfanilamide in, 251, 321, 322  
   tests of cure with and without, 333-335  
 sulfapyridine in, 252  
 sulfathiazole in, 252, 323  
 symptoms of, 314-315  
 traumatic treatment in, 347  
 treatment, 321-335  
   dispensary versus office, 325  
   local, 326  
   results prior to discovery of sulfanilamide, 324  
 urethral stricture due to, 347
- Gonorrheal arthritis following incision of para-urethral sinus, 295  
 cystitis, cystoscopy in, 706-707  
 epididymitis, acute hydrocele associated with, 421  
 infection, modes of, 314  
 prostatitis. See *Prostatitis, gonorrheal*.  
 urethra, pressure limit in irrigation, 206
- Gouley catheter in urethral stricture, 354
- Gram method of staining, 10  
 bacteriuria and, 92  
 diagnosis corrected by, 98  
 gonococci differentiated from diplococci by, 312  
 iodine solution in, 107  
 modified, procedure in, 102  
 origin and principles of, 117  
 preparation of prostatic secretion for, 99  
   of urine for, 99
- Gram-negative and gram-positive bacteria, differentiation of, 117
- Gram-positive bacteria, varying nature of, 118
- Granuloma inguinale, 300-301  
 cause of, 301  
 diagnosis, 301  
 pathology, 300  
 symptoms, 300  
 treatment, 301  
 of bladder, 627  
 tropicum. See *Granuloma inguinale, tuberculous*, of bladder, 684  
 venereum. See *Granuloma inguinale*.
- Gravity method, pyelographic fluids introduced by, 650

- Grawitz tumor of kidney, 512
- Guaiacol and calomel for inflamed bladder, 200
- in treatment of tenesmus following intravesical procedures, 200
- in olive oil for tenesmus of bladder, 179
- for tuberculous bladder 446
- in panmural cystitis after fulguration, 701
- in vesical leukoplakia, 713
- liquid, for relief of urinary pain in urethral tuberculosis, 358
- Guerin, valve of investigation of, at meatotomy 284
- Habit bladder cystoscopy in, 676-679
- pseudo atony of bladder, cystoscopy in 678
- trabeculation of bladder, cystoscopy in, 677-678
- simulating spinal cord lesion, 677
- Haller, aberrant vas of, 38
- Hands care of the 25
- Hay fever, bladder symptoms associated with 709
- Heat external, general rules of application of, 227
- in ureteral calculus, 471
- treatment with, 227-234
- therapeutic value of, 229
- Heller's nitric acid test for albumin in urine, 89
- Hematocele 427-428
- diagnosis 420-421, 428
- fluctuation in, to differentiate from testicular neoplasm, 436
- treatment of, 428
- Hematoma in fracture of penis 306
- Hematuria 75 181-183
- causes of 182
- cystoscopy in 571, 574 610-612
- cystoscopy in presence of, 610-612
- diagnosis of 183
- in cystitis emphysematosa, 711
- in cystitis haemorrhagica, 705
- in hydronephrosis, 489
- in kidney rupture, 516
- in prostatic carcinoma, 401
- in renal calculus 508
- in renal neoplasm, 513-514
- in renal tuberculosis, 498-499
- in vesical calculus, 451
- in vesical endometrioma, 719
- in vesical tumor, 452
- papilloma as occasional cause of, 182
- Hemorrhage, cystoscopy in presence of, 610-612
- in prostatic obstruction, 391
- in retention of urine, 459
- of kidney, calcium gluconate for 518
- Hemorrhage of spinal cord, petechial, frequency of urinauon caused by, 172
- petechial, of renal pelvis, in pyelonephritis, 477
- of spinal cord, frequency of urinauon caused by, 172
- submucosal, of bladder 672
- Hemorrhagic cystitis, cystoscopy in, 704-706
- Hemospermia, 187-189
- in genital tuberculosis 187
- nontuberculous, treatment of 188-189
- prostatic congestion associated with, 187
- sexual excitement in, role of, 188
- tuberculosis of seminal vesicles and 188
- Hermaphroditism, 287
- Hernia of vesical sphincter, posterior urethra in, 616
- Herpes progeneralis 293
- causes of, 293
- circumcision as preventive against 281
- resemblance to chaneroid, 293
- treatment of, 293
- High frequency fulguration of chancroid, 297
- High pressure injections and irrigations, gonorrheal complications caused by, 336
- Histology of epithelium, relation of, to urogenital infection, 68
- History, data to be included in, 73
- taking 72
- in sexual impotence, 537
- in urethritis, 343
- Hives of bladder, 708
- Homes glands 52, 593
- Homosexuality, 553-554
- hormonal secretion in, 553
- Hormonal administration in sexual maldevelopment, 531
- secretion, feminine type of, in homosexuality, 553
- therapy, 272-274
- contraindications to, 272
- in children, 273
- Hormone, testicular, 64
- Horse-collar prostatic hypertrophy, 387
- Horseshoe kidney, 522 524, 655
- diagnosis, 523
- pain in, 523
- symptoms 523
- treatment, 524
- Huhner test for penetration of spermatozoa into uterine cavity, 439
- Hunner ulcer, 672, 697-701
- bladder pain in 169
- cystoscopic appearance, 698-700
- etiology, 697-698
- in vesical inflammation, 672
- pathology 698

- Hunner ulcer, symptoms, 698  
treatment, 700-701  
with oil of gomenol, 200
- Hydatid of Morgagni, 58
- Hydrocele, 420-423  
acute, 421  
associated with gonorrheal epididymitis, 421  
symptoms of, 421  
treatment of, 421  
associated with inflammation of testicle, 429  
causes of, 420  
chronic, 423  
etiology, 423  
pathology, 423  
symptoms, 423  
treatment, 423  
classifications of, 420  
congenital, 420  
symptoms, 421-422  
treatment, 422  
differentiated from hernia, 420  
examination of, 420  
infantile, 422  
treatment of, 422  
injection treatment of, 423  
multilocular, due to unsuccessful injection treatment, 423  
nonspecific epididymitis associated with, 415  
syphilitic epididymitis and, 419  
tapping of, 286  
testicular tumor differentiated from, 436  
disguised by, 435  
types of, 422  
unilocular, of tunica vaginalis testis, 423  
varicoeleectomy followed by, 426
- Hydrogen peroxide dressing for erosive balanitis, 299
- Hydrogen-ion concentration in urine, effect of mandelic acid on, 260  
estimation of, nitrazine test for, 86  
regulation by kidney, 31
- Hydronephrosis, 486-490  
congenital factors in, 487  
congenital urethral valves causing, 486  
diagnosis, 489  
differentiated from pyonephrosis, 491  
etiology, 486-488  
following removal of ureteral calculus, 664  
infected, 477  
nephrectomy in, 490  
papillary carcinoma of ureteral orifice causing, 490  
pathology, 488-489  
pathology of, intrapelvic pressure in, 488  
pelvic calculi and, 656
- Hydronephrosis, reno-ureterectomy in, 490  
residual urine in, without obstructive lesion, 153  
symptoms, 489  
treatment, 489-490  
urethral stricture causing, 486
- Hydronephrotic cysts in calculous pyelonephritis, 487  
destruction of kidney from lower tract obstruction, 488, 489  
distention, nephrolithiasis and, 506  
kidney, resumption of function in, 489
- Hydrostatic pressure in bladder irrigation, 333
- Hyoscyamus, 249  
for relief of bladder tenesmus, 179
- Hyperemia of trigone in cystoscopy, 669  
vesical, cystoscopy in, 669  
diagnosis, 669
- Hypernephroma, 511
- Hyperparathyroidism, renal calculus and, 505
- Hyperthermia, prolonged, 245  
in epididymitis, 341
- Hyperthyroidism, intravenous urography in, contraindications to, 648
- Hypertoncity in neurogenic bladder, 465
- Hypnotics, 245-248
- Hypogastric artery, 40  
nerve, action in urination, 150  
plexus and nerves of penis, 64
- Hypoplastic kidney, cyst in, 524
- Hypospadias, 310  
dilatation of meatus by sound in, 284  
operative prognosis, 310  
types of, 311
- Hysteria, anuria associated with, 176
- Idiogenic pain, 170  
reality of, 166
- Idiosyncrasy, individual, sulfanilamide reactions and, 251
- Illumination of cystoscope, adjustment of, 563-564  
difficulties in, 564-565
- Immersion sterilization of cystoscopes, 561
- Immobilization in gonorrheal arthritis, 341
- Immunity in gonorrhea, temporary, 314  
to gonococcal infection, stimulation of, by injections, 254
- Impotence, sexual, 536-541  
aphrodisiacs in, 538  
mother fixation in, 541  
onset of, sudden, 537  
psychotherapy in, 539-540
- Incontinence of retention, 173  
causation and etiology, 174  
of urine, as a symptom of various diseases, 174

- Incontinence of urine, differential diagnosis of, 174  
 neurogenic bladder as a cause of, 462
- Indigo carmine test, 139  
 advantages of, 640-641  
 color memory in, 641  
 diagnostic error in, possibilities of, 641  
 technic of, 641-642  
 value of, 642
- Induration of penis, plastic, 303  
 of seminal vesicles in tuberculous seminal vesiculitis, 406
- Indwelling catheter, 221-224
- Infant, cystoscopes for use in bladder of, 560-561
- Infantile hydrocele, 422  
 treatment, 422
- Infarct of kidney in pyelonephritis, 477  
 septic, 500
- Infection of urogenital tract, determining factors in precipitation and duration, 67  
 primary, in urogenital tract, skepticism of, 67  
 spread of, from improper hydrostatic irrigation, 203  
 urogenital, anatomic structure in relation to, 66
- Infiltration anesthesia, 278
- Inflammation of bladder, cystoscopy in, 560-573  
 contraindications to, 572  
 edema in, 671  
 leukoplakia in, 671
- Influenza, renal carbuncle following, 501
- Influenzal epidemics, urethritis and, 346
- Inguinal adenitis, 297  
 lymph nodes, enlargement of, in herpes progenitalis, 292  
 ring, relaxed internal, in testicular neuralgia, 431
- Injections in anterior urethra, 207  
 rubber-bulb syringe in, 207
- Injury of kidney, 515-518. *See also Rupture of Kidney.*  
 of scrotum, 407  
 of testicle, 431-432  
 fatality from shock in, 431  
 pathology, 432  
 symptoms, 431  
 treatment, 432
- of urethra, 355-357  
 classification of, 356  
 diagnosis, 356  
 pathology of, 355  
 prognosis, 356  
 stricture following, 357  
 symptoms, 356  
 treatment, 357  
 surgical, 357
- Inoculation, animal, in diagnosis of renal tuberculosis, 499
- Inspection, visual, of patient as unit, 125
- Instillation, 207-209  
 into urethra, Keyes-Ultzmann syringe in, 208  
 technic of, 208
- Instrumental procedures, contraindications to, 76
- Instrumentation in diagnosis of prostatic tuberculosis, 385  
 of urethra, 209  
 anatomic considerations in, 213  
 fatality from, 210  
 fever following, 210  
 infection of residual urine by, 211  
 pain in, 211  
 poor risks for, 210
- Instruments for acute urinary retention, 460  
 for heat applications, 230  
 of small diameter, false passage produced by solid urethral, 213  
 sensations imparted to fingers by, informative value of, 153  
 sterilization of, 23  
 straight, technic of passing, into posterior urethra and bladder, 144-146  
 methral, traumatizing possibilities of, 213
- Intercystogen* A1<sup>1</sup>  
 diagnosis, 413  
 treatment, 413
- Intercystic ridge, 39, 589
- Intra-abdominal pressure, rupture of bladder due to, 443
- Intracystic pressure, distention and, 149
- Intrapelvic pressure, hydronephrotic pathology affected by, 488
- testicle, new growth in, diagnosis of, 436
- Intra urethral pressure, safe, for irrigation, 205
- Intravenous anesthesia, 280-281
- Intravesical contour, minor changes in, cystoscopy in, 605-610  
 herniation, suprapubic prostatectomy in, 621
- Iodine solution in Gram's method, importance of, 102
- Iopax, 649
- Irradiation in carcinoma of penis, 308  
 in plastic induration of penis, 304  
 in prostatic carcinoma, 402-403  
 sarcoma, 404  
 in urethral malignant growths, 366  
 in vesical malignancy, 456-457  
 preoperative, in testicular neoplasm, 437
- Irrigating cystoscope, 570
- Irrigation, 201-207

- Irrigation, arrangement of apparatus for, 202  
 for acute anterior urethral gonorrhea, hydrostatic pressure in, 203  
 infection spread through improper, 203  
 of anterior urethra, 204, 205  
 of lower urinary tract, definition of, 203  
 of posterior urethra, 204, 205-207  
 position of fountain in, 202  
 of patient during, 204  
 rectal, irritation from, 232  
 self-administered, 207
- Itch mite. See *Scabies*.
- JOHNSON stone-basket, 665-666
- Joint involvement in focal infective prostatitis, 380
- KELLER's potassium hydroxide test for blood in urine, 93  
 for hemin crystals in urine, 93
- Kelly endoscope for removal of foreign body from female bladder, 722
- Ketogenic diet, 260  
 elaborate, 263-265  
 hospital procedure indicated in, 260  
 in bacteriuria, 186  
 in pyelitis, 485  
 in urinary infections of children, 260  
 low calory, 266-267  
 simplified, 265-266
- Ketosis in pyelitis, 485  
 urinary infection treated by induced, 263
- Keyes-Ultzmann syringe for instillations into urethra, 208
- Kidney, abscess of cortex of, spontaneous recovery in, 503  
 absorption by, 31  
 anatomy of, 26  
 blood-regulating function of, 31  
 calcareous plaques of, 503, 504
- Kidney, calculus of, 503-510  
 acid ash diet to dissolve, 267  
 acidification in, 509  
 bilateral, 654  
 diagnosis, 509  
 diet in, 509  
 etiology, 503-505  
 frequency of urination in, 508  
 hematuria in, 508  
 hyperparathyroidism and, 505  
 operative removal of, 509-510  
 pain in, 507-508  
 pathology, 505-507  
 polyuria in, 175  
 pyuria in, 508  
 suppression of urine, 508
- Kidney, calculus of, symptoms, 507-508  
 treatment, 509-510  
 sulfonamides in, 262  
 uremia in, 506
- carbuncle of, 476, 500-503  
 diagnosis, 502  
 exploratory operation in, 502  
 multiple, 501  
 pathology, 501-502  
 skin infection and, interval between, 501  
 symptoms, 502  
 treatment, 503
- carcinoma of, papillary, 512  
 compensatory hypertrophy of one, accompanying destruction of other, 167  
 cortex of, calculi in, 505  
 cyst of, 524-525  
 diagnosis, 524-525  
 symptoms, 524  
 treatment, 525
- diseases of, 475-525  
 dysfunction, nonprotein nitrogen content of blood in, 141  
 "floating," 518  
 focal infections involving, 475  
 fossa of, shallowness, as cause of nephrosis, 519  
 function, 31  
 back-pressure' and, 488  
 changes in advanced age, 32  
 in pyonephrosis, 492  
 reduction of, due to urethral stricture, 352  
 restoration of, before surgery, 176  
 testes, 137-142  
 blood chemistry, 140  
 differential, 640-643  
 intravenous versus intramuscular injection in, 641  
 indigo carmine, 139  
 nonprotein nitrogen retention, 141  
 phenolsulfophthalein, 137  
 urea nitrogen retention, 141
- Grawitz tumor of, 512  
 hemorrhage, calcium gluconate for, 518  
 horseshoe, 522-524, 655  
 diagnosis, 523  
 pain in, 523  
 symptoms, 523  
 treatment, 524
- hydrogen-ion concentration regulated by, 31  
 hypertrophy of, compensatory, in renal tuberculosis, 499  
 hypertrophying, mistaken removal of, 168  
 hypoplastic, cyst in, 524  
 fibrocaceous tuberculosis in, 495  
 infarct of, septic, 500



- kidney, infections of, bowel as source of, 476  
 injury to, 513-518  
 lymphatic transference of infections to, 476  
 lymphatics of, 31  
 mobile, 26  
 movable See *Kidney, ptosis of*  
 movement of, in inspiration, 518  
 neoplasm of, 510-515  
   cachexia in, 514  
   diagnosis, 514  
   hematuria in, 513-514  
   pain in, 513, 514  
   roentgenography of, 514  
   treatment, 515  
   varicocele in, 514  
 normal position of, 27  
 pain sense in, absence of, 167  
 palpation of, 76, 125-128  
 papilloma of, 512  
 pedicle, 28  
 pelvis, anatomy of, 33  
   function of, 34  
   tissue pressure in, 34  
   in pregnancy, roentgenography of, 657-659  
   overdistention, danger of, in use of opiates for pyelography, 651  
   papillomatosis of, 473  
   pyelographic appearance, in various conditions, 652  
   reaction of, to chemical applications, 195  
   silver nitrate, tolerance of, 197  
   variability of structure, 33  
 plexus, 31  
 polycystic disease of, 520-522  
   diagnosis, 521-522  
   pyelographic appearance, 655  
   symptoms, 521  
   treatment, 522  
 position of, in relation to ribs, 27  
 ptosis of, 518-520, 656  
   diagnosis, 520  
   etiology, 519  
   neurotic symptoms in, 520  
   pathology, 519  
   renal fossa, shallowness of, in, 519  
   treatment, 520  
 pyonephron, 658  
 rupture of, diagnosis, 517  
   hematuria in, 516  
   shock in, 516  
   treatment, 517-518  
   types of, 516  
   urography in, 517  
 structural relations to other abdominal organs, 29  
 structure, schema of, 30  
 kidney, surgical removal, in acute prolonged pyelonephritis, 479  
 tuberculosis of, 493-500  
   age incidence in, 498  
   bilateral involvement in, 499  
   burning of urination in, 498  
   course of infection in, 499  
   diagnosis, 499  
   etiology, 494-495  
   foci of infection in, 494  
   golf hole ureteral meatus in, 633  
   hematuria in, 498-499  
   mortality without operation, 499  
   operative contraindications, 500  
   pain in, 499  
   polyuria in, 498  
     in early stages of, 174  
   prognosis, 499  
   spontaneous cure in, 496-497  
   study of urine for, 100  
   symptoms, 497-499  
   treatment, 499  
 tuberculous cavitation of, 497  
   destruction of, complete, 496  
 urines, separate, 643-644  
 Wilms' tumor of, 510  
 "Kiss tumors," 453  
 Knee chest position in cystoscopy, 580  
 Koch's urethroscope, 143  
  
 LABORATORY procedures in office, 77  
 Lamps, cystoscope, care of, 563-564  
 Larkspur for pediculosis, 412  
 Lassar's paste for intertrigo, 413  
 Lateral lobe infections, cystoscopic appearance of, 600  
 LeFort sound in urethral stricture, 335  
 Lecithin bodies, prostatic secretion in semen revealed by, 115  
   granules in prostatic secretion, deep infection indicated by, 111  
 Leg holders in cystoscopy, 578-579  
 Lens, fogging of, in cystoscopy, 566-567  
 Leucin crystals in urine, 97  
 Leukocyte count in prostatic abscess, rise in, 383  
   in prostatic secretion, method of determining, 100  
 Leukocytes in prostatic secretion, clumps of, as evidence of poor drainage, 112  
   number of, 112  
   in urine, normal limit of, 179  
   source of, 179  
 Leukocytosis in vesical rupture, 444  
 Leukoplakia, ureteral neoplasms preceded by, 473  
   vesical, causes, 712  
   cystoscopy in, 712-713

- Leukoplakia, vesical, pathology, 713  
 symptoms, 713  
 treatment, 713  
 tumor and, 452
- Leydig cells of testis, 59
- Lipuria, sign of, 90
- Litholapaxy, 691
- Littre, glands of, 48  
 endoscopic study of, 147  
 extension into corpus spongiosum, 62
- Local infiltration anesthesia, technic of, 278  
 medication, 195-201  
 methods of applying, 201-209  
 types of, 195
- Lordosis, lumbar, cystoscopy in, position for, 580
- Luxation of testicle, 432-433
- Lymph channel, blockage of, in scrotal elephantiasis, 409  
 node involvement, absence of, in early penile carcinoma, 307  
 pelvic, metastasis of urethral sarcoma into, 365  
 testicular neoplasms involving, 435  
 scrotum, 409
- Lymphangitis of penis, 292  
 penile, gonorrhea complicated by, 337
- Lymphatics of kidney, 31  
 of testis, 59  
 of ureter, 37
- Lymphocystic bodies on posterior urethra, 599  
 lesions, cystoscopic discovery of, 596  
 in urethral tumor, 362
- Lymphogranulomatosis inguinalis. See *Lymphopathia venereum*.
- Lymphopathia venereum, 302-305  
 anorectal stricture in, 302  
 diagnosis, 303  
 Frei test in, 303  
 pathology, 302  
 symptoms, 302  
 treatment, 303
- MacKENZIE and Beck cystometer, 148
- Malakoplakia, cystoscopy in, 714-715  
 etiology, 714  
 in male and female, 714  
 treatment, 715
- Malignant change in papilloma of bladder, 624-625  
 growth of urethra, 365  
 diagnosis, 366  
 prognosis, 366
- Malignant growth of urethra, symptoms, 366  
 treatment, 366
- Mandelic acid, 260-261  
 as urinary antiseptic, 250  
 bactericidal influence of, 261  
 course of treatment with, 261  
 in pyelonephritis, 481
- Mandrin, 17
- Manipulation of prostate gland, traumatic, gonorrheal prostatitis caused by, 372
- Masturbation, 550-553  
 in adults, 552-553  
 in small children, 552  
 local changes due to, 551  
 psychotherapy in, 552  
 sexual disability and, 532-533  
 verumontanal congestion and, 532  
 verumontanum in, cystoscopic appearance of, 598
- McCarthy cysto-urethroscope, 144  
 panendoscope, 144, 560  
 in ureteral calculus, 662
- Meatotomy, ureteral, 631-634
- Meatotomy, after-care in, 285  
 anesthesia in, 284  
 bleeding after, control of, 285  
 congenital valves of urethra treated by, 367  
 dilatation of urethral stricture assisted by, 354  
 gonorrheal arthritis following, 284  
 in urethral calculus, 360  
 papilloma, 365  
 indications and contraindications, 284  
 technic of, 283  
 ureteral, cystoscopy in, 631-634
- Meatus, external urinary, imperforate, retention in infancy from, 458  
 small, prevalence of, 283
- pin-point, 284  
 diverticulum of bladder and, 449  
 hydronephrosis caused by, 486  
 urethral, choice of catheter size influenced by, 217
- Mecholyl, 253  
 as urinary antiseptic, 253  
 detrusor muscle contraction with, 253  
 dosage of, 253
- Median bar, cystoscopic evidence of, 609  
 cystoscopy in, 612-614  
 dysuria caused by, 177  
 muscular tension in cystoscopy simulating, 596  
 simulated by muscular tension in cystoscopy, 596  
 treatment of, 394-395  
 urethral sound in early stages of, 212  
 urethral trigone in, shortening of, 614  
 vesical diverticulum and, 449  
 commissure, cystoscopic study of, 619

- Median lobe, fulguration of, 620  
hypertrophy with vesical trabeculation, 617  
raphe, 45
- Medicaments, internal, 243-253
- Medication, local, 195-201  
types of, 195  
oral, in gonorrhea, 327-328
- Meningococcus and gonococcus, differentiation of, 312
- Mental See also *Psychic, Psychogenic, Psychotherapy*  
alertness, prostatic function and, 53  
attitude in sex performances, ejaculatory failure and, 543  
factor in frequency of urination, 158  
in sex urge, 527  
fixations and urination, 159  
pseudo-education fostering, 165  
influences simulating hypertrophy of prostate gland 160  
upon sexual function, 160  
interference with urination, 157  
states due to urogenital factors, 164
- Mercurial ointments in pediculosis, 412
- Mercuric iodide for asepsis in pyelography, 653
- Mercurochrome as bactericide in urinary retention, 199  
for chancroid 298  
for prophylaxis in gonorrhea, 321  
in pelvic lavage, 485  
intravenous use of, dangers in, 199
- Mercury, bichloride of, irrigation of tuberculous bladder with, 199
- Metastasis in testicular neoplasm, speed of, 435  
of bladder tumor, 456
- Methenamine, 260  
as urinary antiseptic, 250  
contraindications to, 260  
discontinuance of, indications for, 260  
dosage of, 250  
in bladder infections, 260  
in preparation for cystoscopy, 577  
urinary asepsis with, 250
- Methylene blue, 84
- Micrococcus catarrhalis and gonococcus, differentiation of, 312
- Micro-orchism, 428
- Micropenis, 287
- Microscopic interpretation of urethral smears, 103-116
- Microscopy, urologic, 77
- Midline groove of prostate gland, sensitivity of, to massage, 241-242
- Mind, influence of, upon urinary function, 157
- Mineral oil, vesical dilatation with, 569
- Monorchism, 428
- Moorhead method of introducing soft catheter into bladder, 218
- Morgagni, crypts of, 48
- Morphine, 247  
in ureteral calculus, 471  
injection of, preliminary to cystoscopy, 578
- Mosenthal test, 87
- Mother fixation in sexual impotence, 541
- Mouth, dry, in chronic vesical distention, 392
- Mucoid discharge astringent injection to clear up, 347  
study of, for *Trichomonas vaginalis*, 347
- Mucosal tabs of vesical outlet, nonpathologic, in female, 592
- Mucous channels of urogenital tract, prolonged infection due to limited drainage in, 67  
membrane, changes in urethral stricture, 351  
infection of, bactericides in, 194  
of bladder, inflammation of, oil of gomenol as sedative for, 200
- Mucus in urine, 90  
shreds in urine, nature and significance of, 108
- Multiple glass tests, 83
- Muschat and Johnston cystometer, 148
- Mycarditis in reaction following prostatic massage, 578
- Necrosis of papilloma, 624
- Necrosperma, 439
- Nessleriac, gram negative staining reaction of, 312
- Neosphenamine, 262  
in cystitis emphysematosa, 711  
in vesical tuberculosis, 446
- Neotopax, 649
- Neoplasm of kidney, 510-515  
cachexia in, 514  
diagnosis, 514  
hematuria in, 513-514  
pain in, 513, 514  
treatment, 515  
varicocele in, 514  
of testicle, 434-438  
diagnosis, 436  
of ureter, 473-474  
symptoms, 474  
treatment, 474  
vesical, 621-631  
location of, 622
- Neostiol, general uses of, 198  
in gonorrhea, inferior effect of, 198  
in nongonorrheal anterior urethritis, 198  
in nonspecific urethritis, 346

- Nephrectomy in hydronephrosis, 490  
 in perinephric abscess, 493  
 in pyelonephritis, 482  
 in renal tuberculosis, 499  
   survival following, 500
- Nephritic countenance, 573
- Nephritis, hemorrhagic, hematuria and, 611
- Nephrolithiasis with hydronephrotic distention, 506
- Nephropexy in ptosis of kidney, 520
- Nephroptosis, 518-520
- Nerve block, sacral, in cystoscopy, 582  
 ends, sedation with calceosol, in bladder irritations, 247  
 poise in sexual function, 528  
 supply of ureter, 37
- Nervous patient as poor risk for instrumentation, 210
- Neuralgia of spermatic cord following varicocele, 425  
 of testicle, 431  
 etiology, 431  
 treatment, 431
- Neurasthenia, masturbation and, 550
- Neurogenic bladder, 461-466  
 catheterization in, 465-466  
 etiology, 462-463  
 hypertonicity in, 465  
 incontinence of urine in, 462  
 overdistention and, 462  
 sensory changes in vesical wall and, 462  
 spinal injuries and, 462  
 suprapubic drainage in, 465-466  
 symptoms, 464, 465  
 tabes dorsalis and, 462  
 treatment, 465  
 dysfunction in urination, 463  
 frequency of urination, 172
- Neuromuscular imbalance in frequency of urination, 171
- Neurosis, sexual, varicocele and, 425
- Neurotic factor in habit pseudocontraction, 678  
 meaning of term, as applied to urogenital patients, 161  
 symptoms in nephroptosis, 520  
 temperament, testicular pain and, 431  
 tendencies and urinary dysfunction, 158
- Neurotics, sexual, 533
- New growth. See *Neoplasm*.
- Nitrazine test for hydrogen-ion concentration in urine, 86
- Nitric acid test for albumin in urine, 89
- Nitrohydrochloric acid, acidification of urine with, 249
- Nocturnal emissions. See *Seminal emissions, involuntary*.
- urinary frequency in urethral stricture, 352
- Nonfilarial scrotal elephantiasis, 409
- Nongonorrheal anterior urethritis, neosilvol in, 198
- Nonprotein nitrogen content of blood, prognostic value of, 141  
 retention in blood, kidney function tested by, 142
- Nonspecific proteins, 255-256  
 form for administration, 255  
 urethritis, 334-337. See also *Urethritis, nonspecific*.  
   microscopic study in, 104
- Nupercaine, bladder flushing with, before local anesthesia for cystoscopy, 581  
 hydrochloride anesthesia, 278
- Obstruction of catheter, points of, 217
- Office, arrangement of, 3  
 floor plans of, 5, 6, 7  
 plumbing of, 8  
 soundproofing of, 4  
 table, 5
- Oil-immersion lens in darkfield study, 154
- Oleum percomorphum, vitamin A yielded by, 268
- Oleum santali, 252
- Oliguria, intravenous pyelography contra-indicated in, 648
- Ophthalmia neonatorum, prophylaxis against, importance of, 323
- Opiates, 247  
 in retrograde pyelography, 651
- Opium, camphorated tincture of, 247  
 suppositories, 248
- Oral medication in gonorrhea, 327
- Orchidectomy in torsion of testicle, 434
- Orchidoepididymectomy in tuberculous epididymitis, 418
- Orchitis, 428-430. See also *Testicle, inflammation of*.  
 associated with epididymitis in tertiary syphilis, 419  
 gummatous, in syphilis, 430  
 tuberculous involvement in, 430  
 interstitial, in syphilis, 430  
 syphilitic, 429-430  
   diagnosis, 430  
   differentiated from malignancy, 430  
   pathology, 430  
   symptoms, 430  
   time of appearance of, 429-430  
   treatment, 430
- Orgasm, repeated, 549
- Otos urethroscopy, 143
- Oudin current, surface lesions fulgurated by, 238
- Overdistention and neurogenic bladder, 462
- Overdistention, habit pseudocontraction after, 678

- Overflow of retention, 173, 463  
 in prostatic obstruction, 391
- Oxaluria, 183-184  
 constipation causing, 183  
 diet in, 269  
 dietary history in, 173  
 influence in, 183  
 etiology of, 172  
 renal colic caused by, 184  
 subjective symptoms of, 184  
 treatment of, 184
- Oxydase test in cultural studies of gonococci, 119
- PAIN, 165-170  
 above ureteropelvic junction, nature of, 167  
 ejaculation accompanied by, 532  
 ideogenic, 170  
 reality of, 166  
 in anterior urethra, 170  
 in bladder, 169  
 in horseshoe kidney, 523  
 in hydronephrosis, 489  
 in kidney, absence of, 167  
 in orchitis, 429  
 in prostate gland, 170  
 in prostatic carcinoma, 401  
 in pyelonephritis, chronic, 480  
 in rectal palpation, meaning of, 128  
 in renal calculus, 507-508  
 neoplasm, 513, 514  
 tuberculosis, 499  
 in retention of urine, 457  
 in seminal vesicles, 170  
 vesiculitis, 405-406  
 in testicle, 170  
 in tuberculous cystitis, 686  
 in ureteral calculus, 469-470  
 in ureteral colic due to calculus, course of, 168  
 in urethral instrumentation, 211  
 in vesical calculus, 451  
 psychogenic, urogenital lesion mimicked by, 76  
 renal, position of patient's hand when indicating, 167  
 sensory memory of, after disappearance of local pathology, 165  
 subconscious nature of, 166  
 testicular, neurotic temperament and, 431  
 transference of, from lesions of trigone and urethra, 168  
 urogenital, deceptive nature of, 76
- Palpation of external genitalia, information gained from, 128  
 of kidneys, 76, 125-128  
 procedure in, 126, 127
- Palpation of rectum, pain, in, meaning of, 128  
 of spermatic cord, 128  
 of urethra for diagnosis of urethral calculus, 360  
 value of, 125
- Pampiniform plexus, varicosities of, in varicocele, 423
- Panendoscope, McCarthy, 144, 560
- Panmural cystitis, cystoscopy in, 697-701  
 etiology, 697-698  
 symptoms, 698  
 treatment, 700-701
- Papillary carcinoma of ureteral orifice, 490
- Papilloma, cystoscopic appearance of, 622-624  
 incidence in tumors of bladder, 453  
 intravesical, location of, 454  
 multiple, of vesical wall, 623  
 necrosis of, 624  
 of bladder, cystoscopy in, 622-627  
 fulguration of, 644  
 location of, 625  
 malignant change in, 624-625  
 pathology of, 623-624  
 prognosis in, 626-627  
 repeated examination after destruction, 626  
 terminal bleeding and, 79  
 treatment, 625-627
- of bulbar urethra, 365  
 of glans penis, 293  
 treatment of, 294
- of kidney, 512
- of urethra, 364-365  
 diagnosis, 365  
 symptoms, 365
- penile, 293  
 treatment with glacial acetic acid, 294
- vesical, terminal bleeding and, 79
- Papillomatosis, multiple, of urethra, 364  
 of kidney pelvis and ureter, 473
- Paradidymus, 58
- Paraffin, liquid, in vesical dilatation, 569
- Parafrenal abscess, gonorrhea complicated by, 337  
 glands, 63
- Paraphimosis, 290  
 causes, 290  
 chancroid complicated by, treatment of, 297  
 gonorrhea complicated by, 336, 337  
 gonorrheal, 291  
 pressure reduction of edema in, 291  
 surgical treatment of, 292  
 treatment, 291
- Para-urethral sinusitis, 294-295  
 treatment of, 294
- Paregonic, 247

- Parenchymal portions of urogenital tract, destruction following infection of, 67  
 Paronychia, renal carbuncle preceded by, 500  
 Pathologic changes, functional aberrations developing into, 163  
 Patient as a factor in choice of indwelling catheter, 221  
 Pedicle, kidney, 28  
 Pediculosis, 411-412  
   pubis, 411  
   treatment of, 411-412  
 Pediculus humanus and *Pediculus vestimenti*, 411  
 Pelvic lavage in pyelitis, 485  
 Pelvis, anesthesia of, complete, 280  
   kidney. *See Kidney pelvis.*  
 Penis, absent, 287  
   anesthesia for operation upon, 278  
     circular, 278-279  
   blood supply of, 63  
   carcinoma of, 307-308  
     diagnosis, 307  
     etiology, 307  
     phimosis in etiology of, 290  
     symptoms, 307  
     treatment, 308  
   clamps, 20, 21  
   concealed, 287  
   deformity of, in paraphimosis, 290  
   diseases of, 287-309  
   dislocation of, 306  
     treatment, 306  
   double, 287  
   dressings for, 331, 332  
   flail-joint condition of, 61  
   fracture of, 306  
     diagnosis, 307  
     symptoms, 306  
     treatment, 307  
   induration of, plastic, 303-305  
   lymphangitis of, 292  
     balanoposthitis associated with, 287  
   lymphatic drainage in, 63  
   malformations of, 287  
   nerve supply of, 64  
   pathology of, circumcision as preventive for, 289  
   plastic induration of, 303-305  
     curvature in, 304  
     fibrous plaques in, 304  
     sexual impotence and, 536  
     symptoms, 304  
     treatment, 304  
       with irradiation, 304  
       with potassium iodide, 304  
       with roentgen rays, 304  
   sarcoma of, 308  
   strangulation of, 306  
   structure of, 60  
 Penis, torsion of, 287  
   tuberculosis of, 308-309  
     circumcision followed by, 308  
     diagnosis, 309  
     pathology, 308  
     treatment, 309  
 Penitis, plastic, 303  
 Penoscrotal angle, pain from posterior urethral disease referred to, 169  
 Pentothal sodium anesthesia in urogenital operations, benefits of, 281  
 Percain anesthesia, 278  
 Perineal drainage in acute prostatic, 384  
   fasciae, 64  
 Perinephric abscess, removal of kidney in, 493  
   symptoms of, 485  
 Perinephritis in renal tuberculosis, 499  
 Perineum, tension upon, in cystoscopy, 578  
 Peripheral nerve ends, hyoscyanus as depressant for, 249  
 Perirenal fasciae, 26  
   fat, 26  
   origin of so-called renal pain, 167  
 Periscope, bending of, 565-566  
 Peristalsis of ureters, loss of, in anuria, 472  
 Peritoneum, irritation of, in kidney rupture, 517  
 Perivesicular structures, 55  
 Permanganate of potash. *See Potassium permanganate.*  
 Pernicious anemia, cystitis haemorrhagica in, 704  
 Perversions, sexual, 526  
 Petechiae, morbilliform, in focal infective cystitis, 705  
 Petechial hemorrhage of renal pelvis in pyelonephritis, 477  
 Peyronie's disease, 303-305  
 pH. *See Hydrogen-ion concentration.*  
 Phagocytosis in gonococcal pathologic process, 314  
   of gonococci in urethral discharge, 307  
 Pharmacopeial preparations in urology, 245  
 Phenol for inflamed bladder, 200  
 Phenolsulfonphthalein test, 137  
   intravenous instead of intramuscular injection for, 138  
   procedure in, 138  
   reliable index in, 138  
 Philips catheter in urethral stricture, 355  
 Phimosis, 288-290  
   acquired, 289  
   carcinoma originating in, 290  
   chancroid complicated by, treatment of, 297  
   circumcision as a preventive in, 289  
   in treatment for, 290

- Phimosis, complication of gonorrhea by,  
treatment, 336  
congenital, 288-289  
in etiology of carcinoma of penis, 307  
treatment, 290
- Phlebitis, penile, gonorrhea complicated  
by, 337
- Phleboliths in prostatic carcinoma, 402
- Phosphate crystals, triple, in freshly-voided  
urine, sign of urinary stagnation 78
- Phosphates, ammoniomagnesium, in urine,  
urinary stasis indicated by, 93  
in urine, 82, 184-185
- Phosphaturia, 184-185, 269  
diet in, 269  
false, 184  
common types of, 185  
treatment in milder cases of, 269  
true, 184  
vitamin A associated with, 184
- Phosphoric acid solution in incrustated  
cystitis, 704
- Phthalein test, appearance time in, 643  
intravenous differential, technic of, 642  
normal output in, 643  
value of, 640
- Pin point urinary meatus, 284
- Plaques, calcareous, of kidney, 503, 504  
fibrous, in plastic penitis, 304
- Plastic induration of penis, 303  
surgery in epispadias, 312  
in scrotal injuries, 407
- Pleasure instinct in sex function, modi-  
fication of, by social inhibition, 528
- Plexus, pampiniform, varicosities of, 423  
renal, 31  
sacral, 42, 43
- Plica interureterica, 39, 589, 602
- Pneumaturia, 187
- Pneumococcus in urethral discharge in in  
fluenza epidemics, 106
- Pneumonia, mild pyelonephritis confused  
with, 478
- Polar vessels, pathology in kidney from,  
28
- Polycystic disease of kidney, 520-522  
diagnosis, 521-522  
pathology, 521  
pyelographic appearance, 655  
symptoms, 521  
treatment, 522
- Polyphosphonuclear leukocytes, gonococ-  
cus in, 312
- Polyorchism, 428
- Polyp of urethra, 363-364  
diagnosis, 364  
sensory symptoms of, 364  
structure, 363  
symptoms, 363-364  
treatment, 364
- Polyuria, 174-175  
causes of, 174  
color of urine in, 84  
in calculus of kidney, 175  
in chronic pyelonephritis, 479  
in tuberculosis of kidney, 174, 498  
output of urine in, 174  
pharmacologic and physiologic back  
ground of, 172
- Position of patient for retrograde pyelo-  
graphy, 653  
for kidney palpation, 126  
for passing of urethral sound, 214  
for rectal palpation, 128
- Posterior irrigations, 204, 205-207
- Postgonorrheal prostatitis, 371-374 See  
also *Prostatitis, gonorrheal*  
thermal treatment of, 230  
stricture, narrowness of urinary stream  
due to, 151  
urethral instrumentation, frequent,  
leading to, 209
- Postmontane fossa, fulguration of, for  
prostatic calculus, 386
- Postoperative urinary infections, antisep-  
tics in, 258
- Postpartum retention of urine, 461
- Posture, recumbent, effect on chyluria,  
186
- Potassium acetate, urinary alkalization  
with, 249  
citrate effervescent, urinary alkalization  
with, 249  
iodide in plastic induration of penis, 304  
permanganate, discontinuance in non  
gonorrheal cases, 110  
for intertrigo, 413  
for prophylaxis in gonorrhea, 321  
for urethral cleansing before indwell-  
ing catheterization, 224  
in urinary retention, 461  
general uses of, 196  
in balanoposthitis, 288  
in erosive balanitis, 299  
in gonorrhea, local treatment with, 327  
in nonspecific urethritis, preliminary  
wash with, 346  
irrigations with prostatic massage,  
urinary shreds caused by, 110  
uses of various strengths of, 196
- Poupart's ligament, 431
- Pregnancy, bladder changes during, cystos-  
copy in study of, 603-604  
mucosa in, 604  
influence of, upon ureters and kidney  
pelves, 657-659  
intravenous urography in, contraindica-  
tion to, 648  
trigone in, distortion of, 603
- Premature ejaculation, 541-544

- Premature ejaculation due to posterior urethral congestion, prostatic massage in, 542  
 silver nitrate in, 542
- Prepuce, 62  
 destruction of, in erosive balanitis, 299  
 imperforate, retention in infancy from, 438  
 reflected layer of, problem in circumcision, 282  
 retraction of, aids to, 279
- Presacral fibers, 42  
 nerves, 42
- Pressure, hydrostatic, in irrigation for acute anterior urethral gonorrhea, 203  
 intrapelvic, reactions to excessive, in pyelography, 649-650  
 reduction of edema in paraphimosis, 291
- Prevesical space, 42
- Prisapism, 305-306  
 causes of, 305  
 symptoms, 305  
 treatment, 305
- Procaine-adrenalin in caudal anesthesia, 280  
 hydrochloride anesthesia, 277
- Prolan test for recurrence of metastasis in testicular tumor, 436
- Prolapse of uterus, bladder changes in, 605
- Prostate gland, abscess of, 381-384. See also under *Prostatic abscess*.  
 anatomy of, 50  
 anterior lobe of, 51  
 arterial supply of, 52  
 calculus of, 386  
 carcinoma of, 399-403  
 acute fulminating, 400  
 clinical course, 400-401  
 duration of symptoms in, 400  
 cystoscopic recognition of, 585  
 cystoscopy in, 631  
 diagnosis, 401-402  
 disseminating, 400  
 dysuria caused by, 177  
 etiology, 399  
 fatality in, 398  
 metastasis in, 400  
 pathology, 399-401  
 scirrhus, 400  
 site of, 399  
 symptoms, 401  
 treatment, 402-403  
 palliative measures in, 403  
 roentgenographic, 403  
 surgical, 402  
 changes in shape of, bladder contour and, 593  
 colon bacilli feeder to bowel, 186  
 congestion of, heat in treatment of, 229
- Prostate gland, congestive swelling of, reduced by heat, 230  
 cross-section of, 371  
 diathermy of, for *Trichomonas vaginalis*, 347  
 digital manipulation of, in gonorrheal prostatitis, 372  
 diseases of, 371-404  
 sexual function and, 533-534  
 examination of, 76  
 excessive secretion due to ungratified sexual excitement, 190  
 fixations upon, 164  
 follicles of, 52  
 function of, 52  
 horse-collar hypertrophy of, 387  
 hypertrophy of, 387. See also *Prostatic obstruction*.  
 absence of signs in rectal palpation for, 388  
 age incidence in, 388, 395  
 bilateral, cystoscopic picture in, 617  
 bleeding in, 391  
 cystoscope in, passage of, 616  
 cystoscopy in, 614-621  
 contraindications to, 573  
 reactions to, 576-577  
 dysuria caused by, 177  
 gonadotropic substances in, 276  
 hemorrhage from cystoscopic trauma in, 615  
 malignant growths in, percentage of, 399  
 mental factors simulating, 160  
 operative procedure in, 397-398  
 value of, 395-396  
 pathologic process of, 389  
 sexual function and, 533-534  
 symptoms, 390  
 treatment, 395-398, 620-621  
 vesical diverticulum and, 449
- infection of, acute, heat in treatment of, 229  
 as cause of prostatic hypertrophy, 389  
 cure retarded by urethral tumor, 362  
 incidence in patients with focal infective symptoms, 376  
 nonspecific urethritis secondary to, 345  
 treatment with massage, 239  
 inflammatory swelling reduced by heat, 230  
 injection into, direct, of bactericides, 374  
 lateral lobes of, 51  
 lymphatics of, 52  
 manipulation of, traumatic, gonorrheal prostatitis due to, 372  
 massage of. See *Prostatic massage*.



- Prostate gland, massage of, in gonorrheal posterior urethral infection, 333  
 median commissure of, 46, 52  
 nerve supply of, 52  
 obstruction of, without infection, as cause of urinary frequency, 173  
 pain in, 170  
 posterior lobe of, 52  
 postgonorrheal infection of, response to massage, 333  
 sarcoma of, 403-404  
   age incidence in, 403  
   diagnosis, 404  
   pathology, 403  
   prognosis, 403  
   symptoms, 403-404  
   treatment, 404  
 size and contour of, estimate of abnormal or normal, 128-130  
 study of, repeated, need for, 110  
 subcervical lobe, Albarran's glands in, 52  
 swollen, digital palpation of, 231  
*Trichomonas vaginalis* infestation of, diathermy in, 234  
 trilobar hypertrophy of, 618  
 tuberculosis of, 384-386  
   cystoscopic recognition of, 385  
   diagnosis, 385  
   instrumentation in, 385  
   pathology of, 385  
   symptoms, 385  
   treatment, 385-386  
   tuberculin in, 386  
   variation in size of, 392  
 Prostatectomy, 389  
 emergency, 393  
 perineal, 398  
   versus suprapubic, 620-621  
 suprapubic, 398  
   in intravesical herniation, 621  
 Prostatic abscess, 381-384  
   large, 382-384  
     diagnosis, 383-384  
     sulfanilamide in, 384  
     surgical intervention in, 383  
     symptoms, 383  
     treatment, 384  
   palpation precipitating, 231  
   small, 381-382  
     rupture of cavity in, direction of, 381  
     symptoms of, 381-382  
     treatment, 382  
   temperature elevation in, 383  
   treatment, 384  
 capsule, carcinoma within, origin of, 402  
 congestion, hemospermia associated with, 187
- Prostatic diathermy, 229  
 ineffectualness of, 229-230  
 function and mental alertness, 53  
 sex stimulation and, 53  
 heater, Bransford Lewis, 231  
   electric, 233  
 hypertrophy as a cause of lower urinary tract obstruction, 151  
   elongation of urethra and, 153  
   urethral sound in, danger of, 212  
 infection as a cause of basal cystitis, 674  
   rôle as bacterial feeder, 372  
 involvement in genital tuberculosis, incidence of, 384  
 lobe obstruction, median, double-curved catheter in, 220  
 massage, 114, 238-244  
   aims of, 239  
   antiseptic instillation following, 209  
   areas sensitive to, 241, 242  
   arthritis in reaction to, 378  
   bleeding caused by, avoidance of, 241  
   contraindications to, 240  
     in tuberculous lesion, 362  
   densensitization of remote areas by, 240  
   diagnostic, reactions to, analysis of, 379-380  
   drainage improved by, 191  
   eye reactions to, 241, 378  
   fever in response to, 378-379  
   for hypertrophy, 390  
   for infection, 239  
   for microscopic specimen of secretion, 83  
   harmful, 373  
   in focal infective prostatitis, 378-379  
   in premature ejaculation owing to posterior urethral congestion, 542  
   in sexual disability, 534  
   influence on well-being of, 52  
   intervals between repetitions of, 243  
   myocarditis in reaction to, 378  
   objectives of, 239  
   position of patient for, 241  
   range of usefulness, 238-239  
   reactions following, 378  
   technic of, 241-244  
   temperature elevation in reaction to, 378-379  
   tonsillectomy or tooth extraction and, interval between, 380  
 obstruction, 386-398  
   age incidence in, 388  
   catheterization in, 393  
   clinical types of, 391  
   cystoscopy in, 393-394  
   diagnosis, 392  
   etiology, 389

- Prostatic obstruction, median lobe, over-curved catheter in, 220  
 single-elbowed catheter in, 219  
 symptoms, 390  
 treatment, 394  
   surgical, 394  
 urethral instrumentation in, 393  
 openings, plainly visible, in infections of prostate gland, 598  
 plexus and nerves of penis, 64  
 secretion, corpora amylacea in, 112  
   ejection of, 190  
   focal infections shown by study of, 110  
   leukocytes in, number of, 112  
   leukocytic content of, determination of, 100  
   microscopic interpretation of, 110  
   normal, appearance of, 110  
   preparation of, for study, 99  
   reduction of leukocytes in, prognostic importance of, 114  
   restudy, in focal infective prostatitis, 380  
   vitalizing principle in, 66  
 substance, compression by hypertrophy, 389
- Prostatism, 390. See also *Prostatic obstruction*.
- vesical cyst simulating, 594
- Prostatitis, acute, gonorrhea complicated by, 339  
   perineal drainage in, 384  
   focal infective, 98, 374-380  
     age incidence in, 375  
     diagnosis of, 377, 378-380  
     etiology of, 375-377  
       gonorrhea in, 375  
     immunity in, 375  
     primary foci in, usual, 376  
     spontaneous cure in, 377  
     symptoms of, 377  
     temperature elevation in, 378-379  
     thermal treatment of, 230  
     tissue-ageing, precocious, in, 376  
     tonsil infection in, incidence of, 376  
     tooth infection in, incidence of, 376  
     treatment of, 377, 378-380  
       importance of toxin tolerance in, 379  
     urethritides due to, 377  
   gonorrheal, 371-374  
     digital manipulation in, contraindications to, 372  
     stroking in treatment of, 372  
     heat in treatment of. See under *Rectal heat*.  
   immunity in, 373  
   nonirritating chemical stimulation of urethra in, 374
- Prostatitis, gonorrheal, spontaneous cure in, 372  
   symptoms, 371-372  
   treatment, 372-374  
   interstitial, differentiated from prostatic carcinoma, 402  
   postgonorrheal, 371-374. See also under *Gonorrheal prostatitis*.  
   thermal treatment of, 230  
   seminal vesiculitis differentiated from, 405  
   sterility and, 440  
   subacute gonorrheal, three-glass test in, 83  
   urinary shreds caused by treatment of, 110
- Prostatorrhea, 190-191, 404
- Protein sensitization, 239  
   silver crystals, mild, for chancroid, 298  
   in gonorrhea, self-treatment with, 329  
   mild, duration of treatment with, 198  
     for para-urethral sinusitis, 294  
     frequency of use of, 198  
     general uses of, 197, 198  
     in acute retention of urine, 461  
     in gonorrhea, local treatment with, 327  
     in nonspecific urethritis, 345  
     in pelvic lavage, 485  
     prophylaxis in gonorrhea with, 321  
   strong, general uses of, 198  
     in cystitis cystica, 717  
     in gonorrhea, local treatment with, 327
- Proteins, foreign, sensitization to, 239  
   nonspecific, 255-256
- Pseudocontracture of bladder, habit, cystoscopy in, 678
- Pseudohermaphroditism, surgical correction of, 287
- Pseudomembranous trigonitis, cystoscopy in, 693-697
- Pseudopolyps of urethra, 363
- Pseudo-atrophy of bladder, habit, cystoscopy in, 678
- Pseudo-education, mental fixations fostered by, 165
- Psychic. See also *Mental*.  
   background of urogenital cases, 72  
   factors in frequency of urination, 171  
     of urogenital symptoms, 156-165  
   impotence, 536  
   impressions of urogenital origin, 164  
   interference with urogenital drainage, 67
- Psychogenic frequency of urination following pathologic conditions of bladder, 173  
   origin, sensory symptoms of, 161  
   sensory symptoms, reality of, 162  
   symptoms of gonorrhea, 163

- Psychoneural basis of sexual function, 533  
 Psychoneurosis, spermatorrhea as basis for, 190  
   urogenital, fear of gonorrhea as common cause of, 165  
 Psychoneurotic, examination of, 73  
 Psychopathologic behavior relative to urination, 158  
 Psychotherapy for frequency of urination, 159  
   for retention of urine, 159  
   for urogenital symptoms, 159, 160, 163  
   in enuresis, 192  
   in masturbation, 552  
   in sexual impotence, 539-540  
   in urinary frequency, 159  
 Psychrophore, 250  
   Eisner, 232  
 Ptosis of kidney, 518-520, 656  
   diagnosis, 520  
   etiology, 519  
   neurotic symptoms in, 520  
   pathology, 519  
   renal fossa, shallowness of, in, 519  
   treatment, 520  
 Pudic nerves, 43  
   internal, penis and, 64  
 Pulmonary tuberculosis, active, intravenous urography contraindicated in, 648  
 Purdy's test for albumin in urine, 89  
 Pus cells in semen, 115  
   in urine, 91  
   composition of, in urethral discharge, 344  
   in urine, 179-181  
   shreds in urine, nature and significance of, 109  
 Pyelitis, 482-486  
   afebrile, 484  
   chronic postural change for emptying residuum in, 483  
   delineation of, 482  
   diagnosis, 484-485  
     ureteral catheterization in, 485  
   diet in, 485  
   fever in, 484  
   in children, treatment with extreme urine reaction swings, 259  
   major classifications, 483  
   pregnancy accompanied by, 483  
   pyuria in, 484  
   roentgenography in, 483  
   spontaneous cure, 483  
   symptoms, 484  
   treatment for, 485-486  
   tuberculous, differential diagnosis of, 485  
   ureteral colic preceding, 484  
 Pyelograms, interpretation of, 654-657  
   retrograde, in pyelitis, 483  
   cystelography, catheter, and intravenous urography, comparison of, 648  
   in hydronephrosis, 489  
   in pyonephrosis, 492  
   in renal carbuncle, 502  
   indications for, 647  
   intravenous, 647-648  
     in ureteral block, 661  
   retrograde, 649-651  
     asepsis with mercuric iodide for, 653  
     position of patient in, 653  
     reactions following, 649  
     technic of, 651-654  
   stagnation of urine in bacteriuria shown by, 185  
 Pyelonephritis, 475-482  
   acute prolonged, diagnosis, 480  
     fever characteristic of, 479  
     mental symptoms of, 479  
     surgical removal of kidney in, 479  
     symptoms of, 478-479  
     treatment for, 481-482  
     ureteral colic in, 478  
   bacteriology of, 477  
   calculous, with hydronephrotic cysts, 487  
   chronic, diagnosis of, 480  
     polyuria in, 479  
     symptoms of, 479-480  
     treatment of, 482  
   clinical aspect of, 477  
   colon bacillus in, 477  
   diagnosis, 480  
   etiology, 471  
   fibrosis of kidney in, 477  
   fulminating, diagnosis, 480  
   fatality from, 477  
   gastrointestinal symptoms in, 478  
   symptoms, 478  
   indwelling catheter and, 222  
   infarcts of kidney in, 477  
   mild, bladder irritation in, 478  
   pneumonia confused with, 478  
   symptoms of, 478  
   urethral chill in, 478  
   overdistention as a cause of, 570  
   pathology, 476-477  
   petechial hemorrhage of renal pelvis in, 477  
   prophylaxis, 480  
   staphylococci and streptococci in, 477  
   symptoms of, 478-480  
   treatment of, 481-482  
   true, differentiated from transient type 210  
   ureteral calculus, removal of, followed by, 664  
   urethral chill and, 210  
 Pyogenic organisms in urethra, cowperitis caused by, 369

- Pyonephrosis, 490-493  
 diagnosis, 492  
 hydronephrosis differentiated from, 491  
 kidney function in, 492  
 pathology, 491-492  
 pyuria in, 492  
 symptoms, 492  
 transference of infection in, 491  
 treatment, 492-493  
 types of, 491
- Pyonephrotic kidney, 658
- Pyridium, 84
- Pyuria, 179-181  
 bacteriologic aspects of, 180  
 catheter contamination in, 180  
 causes of, 180  
 chronic pyelonephritis and, 477  
 cystoscopy in, 179  
 diagnostic measures in, 179  
 false reports of, due to instrumental trauma, 644  
 in bladder with diverticulum, 449  
 in pyelitis, 484  
 in pyonephrosis, 492  
 in renal calculus, 508  
 in vesical calculus, 451  
 middle or upper tract, cystoscopy in, 571  
 staphylococcic cystitis associated with, 718  
 two-glass test in, 179  
 vesical tenesmus associated with, 178
- QUIESCENT period, danger of, in gonorrhea treated with sulfanilamide, 334
- RADIUM therapy. See also *Irradiation*.  
 in carcinoma of prostate gland, 402-403  
 in prostatic sarcoma, 404
- Randall-Moorhead sterilizing ray, 562
- Records, equipment for, 74
- Rectal heat, modes of application, 232  
 prostatic abscess increased by, 383  
 therapeutic application of, 228
- irrigator, Boyd, 232
- lavage, heat application by, 232
- palpation, 128-130  
 diagnostic value in prostatic hypertrophy, 392  
 for diagnosis of prostatic hypertrophy, 388  
 in prostatic carcinoma, 401  
 position of patient in, 128
- psychrophores, 232, 233
- Rectum, irritation of, by irrigations, 232  
 pain in palpation of, meaning of, 128  
 palpation of, 128-130
- Red blood-cells. See *Erythrocytes*.
- Reduplication of ureter, 467
- Renal. See also *Kidney*.  
 plexus, 31  
 decapsulation and denervation in treatment of anuria, 177  
 pain, position of hand of patient indicating, 167
- Reno-renal reflex, 167
- Reno-ureterectomy in hydronephrosis, 490
- Replacement therapy, 273
- Residual urine, antiseptics for, 258  
 cystoscopy in, asepsis for, 615  
 reactions to, 576  
 in postpartum patients, 461  
 infection of, by urethral instruments, 211  
 value as indication of obstructive lesion, 153  
 withdrawal during cystoscopy, 587
- Retention cysts, 595  
 of urine, acute, 457-461  
 childbirth and, 461  
 as complication of gonorrhea, 336  
 complete, in uncontrolled prostatism, 391  
 compressor urethrae in, rôle of, 458  
 during gonorrhea, psychic nature of, 158  
 etiology, 458-459  
 hemorrhage in, 459  
 instruments in, 460  
 obstructive causes, 458, 459  
 pain in, 457  
 postoperative, 461  
 prognosis, 459  
 sitz bath, hot, for, 228  
 treatment, 459-461  
 from blood-clot in bladder, 460  
 in infancy and childhood, 458  
 in prostatic abscess, 383  
 operation for, contraindications to, 222  
 pelvic, catheterization in diagnosis of, 637  
 psychic, after middle life, 158  
 psychotherapy for, 159  
 vesical decompression for cystoscopy in, 577-578
- overflow of, 173, 463  
 in prostatic obstruction, 391
- Retrograde pyelography, 649-654  
 reactions to, 649  
 technic of, 651-654
- Retzius, space of, 42
- Ribs, kidney in relation to, position of, 27
- Roentgen therapy for spermatocoele, 427  
 for vesical malignancy, 456-457  
 in carcinoma of prostate, 403  
 in intertrigo, 413  
 in penile tuberculosis, 309

- Roentgen therapy in plastic induration of penis, 304  
     in prostatic sarcoma, 404  
 Roentgenographic study in anuria, 176  
     in urethral calculus, 360  
 Roentgenography, 646-649 See also under *Pyelography*  
     faulty interpretation in, possibilities of, 646  
     in diagnosis of prostatic calculus, 386  
     of urethral diverticulum, 359  
     vesical diverticulum, 450  
     vesical rupture, 445  
     in prostatic carcinoma, 400  
     in pyelitis, 483  
     in renal calculus, 509  
     neoplasm, 514  
     in upper urinary tract infections, 639-640  
     in ureteral calculus, 472, 660-667  
         limitations of, 660  
     in ureteral stricture, 667-668  
     in urogenital diagnosis, 150  
         advantages of, 133  
         limitations of, 130-133  
     limitations of, 646  
 Rongeur, cystoscopic Youngs, 559  
 Rotation of testicle See *Testicle, torsion of*  
 Round-cell infiltration, anterior urethral trauma causing, 348  
 Rubin test for patency of fallopian tubes 439  
 Rugae in bladder 38  
     of bladder mucosa, 590  
 Rugous folds in urethrae of women, 363  
 Rupture of bladder, 443-445. See also under *Bladder, rupture of*  
     of kidney, cystoscopy in, 517  
     diagnosis, 517  
     hematuria in, 516  
     shock in, 516  
     treatment, 517-518  
     types of, 516  
     urography in, 517  
     of prostatic abscess cavity, direction of, 381  
     of urethra, mortality from, 357  
 SACRAL nerve block, 280  
     in cystoscopy, 582  
     plexus, 42, 43  
     skin, swelling of, in caudal anesthesia, 280  
 Salicylic acid for venereal warts, 200  
     acetic acid and, in mixture for venereal warts, 200  
 Salt solution in enuresis, 192  
 Sandalwood oil, 252-253  
     Sandalwood oil, as urinary antiseptic, 252  
         dosage, 253  
         gonorrheal discharge and, 328  
         sedative influence in gonorrhea, 253  
 Sarcoma of penis, 308  
     of prostate gland, 403-404  
         age incidence in, 403  
         diagnosis, 404  
         pathology, 403  
         prognosis, 403  
         symptoms, 403-404  
         treatment, 404  
     of urethra, 360  
 Sarcophages scabiei, 412  
 Scabies, 412-413  
     symptoms, 412  
     treatment, 412-413  
 Scar tissue in posterior urethra, 601  
     urethral stricture in, 350  
 Scrotal contents, diseases of, 414-441  
     examination of, 75  
     support of, in gonorrheal epididymitis, 340  
     edema, 407-408  
     gangrene, 408-409  
         etiology, 408  
         new serotum in, 407  
         symptoms, 408-409  
         thrombophlebitis as a cause of, 408  
         treatment, 409  
     skin, cyst of, 407  
     support and pressure, adhesive dressing for, 235  
         double spica bandage for, 236  
 Scrotum, anesthesia for operation upon, 278  
     diseases of, 407-413  
     elephantiasis of, 409  
     epithelioma of, 411-412  
         diagnosis, 410-411  
         pathology, 410  
     inflammations of, pressure and support in, 234  
     injuries to, 407  
         treatment of, 407  
     structure and contents, 56  
     support of and pressure on, 234-238  
 Secondary sex characteristics, hormone therapy and, 275  
 Sedatives, 245-248  
     oral, in gonorrheal posterior urethral infection, 333  
     psychic obstacle to use of indwelling catheter overcome by, 221  
 Semen, expulsion of, mechanism for, 49  
     preparation of, for study, 100  
     retained, impregnation from, rarity of, 441  
 Seminal emissions, involuntary, 544-547  
     silver nitrate for, 546

- Seminal emissions, involuntary, treatment, 546
- nocturnal, due to urethral polyp, 364
  - fluid, blood in, 187
  - microscopic interpretation of, 114
- vesicles, coats of, 55
- contents of, 65
  - diseases of, 404-406
    - sexual function and, 534
  - examination of, 76
    - during rectal palpation, 130
  - function of, 65
  - gonorrheal infection of, 371
  - infection of, types of, 405
  - injections into, value of, 339
  - location and structure of, 53
  - pain in, 170
  - pus in, determination of presence of, 114
  - spermatozoal storage in, 65
  - stripping of, 243
    - digital, in gonorrheal seminal vesiculitis, 339
  - x-ray study of, 136
- vesiculectomy and vesiculotomy in gonorrheal seminal vesiculitis, 339
- vesiculitis, 404-406
- diagnosis, 406
  - differentiated from associated prostatitis, 405
  - foreign protein injections in, 255
  - gonorrheal, 339
    - surgical procedure in, 339
    - treatment of, 339
  - prostatic infection and, 405
  - sterility and, 440
  - symptoms, 405-406
  - treatment, 406
  - tuberculous, 406
- Seminiferous tubes, 59
- Sensitization, protein, 239
- Sensory fibers and reflexes of urination, 43
- symptoms caused by urethral polyp, 364
  - psychogenic origin, 161
  - psychogenic, reality of, 162
- Septic absorption in renal carbuncle, 502
- Septuli testis, 59
- Serenum, 84
- Sessility of carcinomata, 628
- Sex hormone therapy, limited uses of, 274
- sterility caused by, 272
- indulgence, chronic gonorrhea caused by, 163
- without return of symptoms, gonorrheal cure indicated by, 334
- stimulation, prostate gland and, 53
- urge, mental factor in, 527
- physiological, 526-527
- Sexual act, duration of, 541-542
- characteristics, secondary, endocrinotherapy and, 275
  - continence, 534-536
  - desire in priapism, absence of, 305
  - in prostatic obstruction, 391
  - disability associated with hydrocele, 425
  - masturbation and, 532-533
  - prostatic massage in, 534
  - excitement, ungratified, excessive prostatic secretion from, 190
  - function, changes in, prostatic hypertrophy and, 533-534
  - mental influences upon, 160
  - nerve-poise in, 528
  - normal and abnormal, 526
  - pleasure urge in, 161
  - posterior urethral disease and, 532
  - prostatic disease and, 533-534
  - psychoneural basis of, 533
  - seminal vesicular disease and, 534
  - urethral sound, psychic influence of, 212
  - urogenital pathology and, 532
  - verumontanum and, 533
- history, change in, securing history of, 74
- impotence, 536-541
- anatomy, 536
  - exhaustion from prolonged illness and, 536
  - mother fixation in, 541
  - onset of, sudden, 537
  - paralytic, 536
  - physiologic, 536
  - plastic induration of penis and, 536
  - psychic, 536
  - psychotherapy in, 539-540
- intercourse, gonorrhea aggravated by, 315
- maldevelopment, hormonal administration in, 531
- neurotics, 533
- outlet, need for, question of, 529
- overindulgence, impotence and, temporary, 536
- performance, endocrinology and, 530
- perversions, 526
- problem, 526-554
- symptoms of urethral polyp, 363
- urge, sublimation of, 535
- vitality, physical state, general, and, 440-441
- Shock in kidney rupture, 516
- in ureteral colic, 471
- instrumentation of urethra causing, 209, 210
- Shreds in urine, clearing up of, 109
- clinical interpretation of, 108
  - microscopic interpretation of, 107

- Shreds true urinary, causes and form of, 108
- Silver nitrate, cauterizing effect of, 197  
destructive effect of, technic for, 197  
effect upon verumontanum, 600  
for involuntary emissions due to posterior urethral congestion, 546  
for urethral cysts, 546  
general uses of, 196, 197  
harmful effects of strong solutions of, 197  
in gonorrhea, local treatment with, 327  
in hemosperrnia, 189  
in premature ejaculation owing to posterior urethral congestion, 542  
in pseudomembranous trigonitis, 694, 697  
in vesical ulcer, 715  
urethral polyp removed by, 364  
tumor treated with, 362
- Simons and Bisher sphincterometer, 148
- Sinus pocularis, 45
- in gonococcal infection, 599  
rectal pain from pathology of, 169
- Sitz bath, hot, 228  
contraindications to, 228  
effects of, 228  
in bladder tenesmus, 179  
in gonorrhea, 228  
method of administering, 228
- Skene's glands, gonococcus in, 323
- Skin, amount to be removed, in circumcision, 282
- Skin infection and renal carbuncle, interval between, 501
- Skiodan, 649
- Smears cytologic classification of, 104  
direct, advantages of, for diagnosis, 98
- Smegma bacillus, tubercle bacillus differentiated from, 122
- Sodium barbital, 248  
bicarbonate, urinary alkalization with, 249  
biphosphate, acidification of urine with, 249  
bromide, 246  
in retrograde pyelography, 654  
chloride dressing in chaneroid, 297  
iodide solution in retrograde pyelography, 653  
in urethrography, 135
- Sound, acorn, 13, 226-227  
bulbar, characteristic hang of, in urethral stricture, 153  
in diagnosis of urethral stricture, 352  
Lefort, 15  
in stricture, 217  
time intervals between passages of, 217  
urethral, 212-217  
urethral, dangers in use of, 212
- Sound, urethral, field of usefulness of, 212  
in dilatation of urethral strictures, 212  
in median bar, 212  
manipulation of, 213  
position of patient in passing of, 214  
technic of passing, 214-217
- Sperm counts, 116  
motility, 115
- Spermatic cord, palpation of, 128
- Spermatocele, 426-427  
diagnosis, 420-421, 426-427  
differentiated from hydrocele in tunica vaginalis, 426  
symptoms, 426  
treatment, 427
- Spermatogenesis, 65, 275-276
- Spermatogenesis, hormone treatments and, 275  
x ray to check, 427
- Spermatogenic function, influence of vitamin E upon, 271
- Spermatorrhea, 189-190  
in stricture of urethra, 190  
psychoneurotic fixation upon, 190
- Spermatozoa, absence of, causes of, 441  
deformities of, 115, 116  
in morning urine, 189  
number of, per c.c. of semen, 440  
method of studying, 115
- Sphincter, external urinary, relaxation of, 463  
forcing of, vesical trabeculation due to, 680  
response in tabes, 680  
tardy relaxation of, in middle life, 158  
urethral, relaxation of, 206  
psychic factor in, 205  
vesical, hernia of, posterior urethra in, 616  
relaxation of, 677
- Sphincterometer, Simons and Bisher, 148
- Spica bandage, double, for scrotal support and pressure, 236
- Spina bifida, enuresis associated with, 192
- Spinal cord, function of, in vesical overdistention, 172  
lesion, habit trabeculation simulating, 677  
ejaculation and, 543  
paralysis of bladder sphincters caused by, 172  
urinary retention in disease of, 458  
injuries and neurogenic bladder, 462
- Splanchnic anesthesia by paravertebral block, anuria treated with, 177
- Squamous cells, formation in protective response to irritation of urethra, 105  
epithelium in urine, chronic cystitis indicated by, 78

- Staining method, 101-103  
 Gram's, 99, 102, 117  
 of spermatozoa for study, 116  
 preparation of material for, 97-101  
 reactions of bacteria common to urogenital tract, table of, 103
- Staphylococci in pyelonephritis, 477  
 in urethral discharge, meaning of, 106
- Staphylococcal cystitis, cystoscopy in, 718-719
- Staphylococcus, differentiation between streptococcus and, 119-121  
 in urine, significance of, 180  
 infection of kidney pelvis, cystoscopic appearance of, 676
- Stasis, urinary, cystoscopy, danger, 663  
 in vesical calculus, 451
- Sterility, 439-442  
 hormone therapy in, 273  
 in alcoholics, 440  
 prostatic infection and, 440  
 roentgen therapy as a cause of, 427  
 treatment of, 441-442  
 vitamins in, 441
- Sterilization of cystoscope, 561-562  
 of hands, 25  
 of instruments, 23-25  
   boiling in, 25  
   formalin gas, 24  
   immersion, 23  
 self-, in gonorrheal seminal vesiculitis, 339
- Sterilizers, 23, 24
- Sterilizing tray, 562
- Stern-McCarthy foreoblique cystoscope, 560  
 for removal of foreign bodies from bladder, 721-722
- Stilet in catheter, use of, 217
- Stone. See also *Calculus* and *Calculi*.  
 extractor, 665
- Strangulation of penis, 306
- Streptococci in pyelonephritis, 477  
 in urethral discharge, meaning of, 106
- Streptococcus, staphylococcus and, differentiation between, 119
- Stricture, congenital, of anterior urethra, 151  
 of lower urinary tract, 151  
 of ureter, cystoscopy in, 667-668  
   focal infection and, 668  
   incidence of, 667  
   roentgenography in, 667-668  
   treatment, 668  
 of urethra, 347-355  
   back-pressure from, causing chronic cowperitis, 369  
   bulbar sound in, characteristic hang of, 153  
   classification of, morphologic, 350  
   diagnosis, 352
- Stricture of urethra, dilatation of, 355  
 meatotomy in, 354  
 diseases contributory to, 347  
 dysuria caused by, 177  
 external trauma as a cause of, 349  
 fibrous, types of, 348  
 follicular abscess as a cause of, 348  
 gas bacillus infection causing, mortality in, 351  
 hydronephrosis caused by, 486  
 in the negro, 352  
 injury leading to, 357  
 instruments in, choice of, 354  
 location of, 348  
 mucous membrane changes in, 351  
 pathology, 350-351  
 postgonorrheal, 347  
   preventable nature of, 348  
   prognosis, 352  
   recontraction in, 351, 352  
   sound in dilatation of, 212  
   "spasmodic," 349-350  
 stages in development of, 350  
 symptoms, 352  
 trauma from chemical prophylaxis causing, 348  
 treatment, 352-355  
   aseptic precautions in, 354  
   surgical, 352-353  
   urinary back-pressure from, 350  
   urinary extravasation in, 351  
   obstruction from, 350  
   vesical diverticulum and, 449  
 postgonorrheal, and urinary stream, 151  
 frequent instrumentation leading to, 209  
 resilient, 351
- Strong protein silver as prophylactic against gonorrhea, 198  
 urethral discharge following, 198  
 for use by patient, strength of, 199
- Subcervical lobe hypertrophy, cystoscopic appearance of, 618
- Subconscious fixations, pain produced by, 166
- Sublimation of sexual urge, 535
- Submucosal hemorrhages of bladder, 672  
 infiltrations in vesical tumor formation, 452
- Subtrigonal glands, 52
- Sugar in urine, quantitative method for testing, 88
- Sulfadiazine, 323
- Sulfamethadiazole, 251
- Sulfanilamide, 250-251, 261  
 as urinary antiseptic, 250, 261  
   advantages of, 262  
   dosage, 251  
   toxic reactions, 251



- Sulfanilamide, bacteria most susceptible to treatment by, 262  
 dangers in use of, 251  
 derivatives, 252, 261-262  
   chemotherapeutic activity, 261  
 dosage of, 251-252  
   for bed patients, 262  
 effect of its introduction on staining methods, 97  
 in chancroid, 297  
 in gonorrhea, dosage, 251-252  
   test of cure with and without, 333-335  
   treatment with, 321-325  
 in gonorrheal epididymitis, 340  
 prostatic, 374  
 in pyelonephritis, 481  
 in prostatic abscess, 384  
 in pyelonephritis, 481  
 in renal carbuncle, 503  
 intracellular digestion of gonococci caused by, 118  
 toxic reactions of, 251  
 Sulfanilic sulfanilamide, 251  
 Sulfapyridine, 252  
   in gonorrhea, treatment with, 323  
 Sulfathiazole, 252  
   in pyelonephritis, 481  
   in renal carbuncle, 503  
 Sulfhydrylthiazole, 253  
 Sulfonamides, 261-262  
   in gonorrhea, 321-325  
   superiority of, 374  
   toxicity rate, 252  
 Sulfur ointment for scabies, 413  
 Suppression of urine in renal calculus, 508  
 Suprapubic discomfort in renal tuberculosis, 498  
   drainage in neurogenic bladder, 465-466  
 Surgical procedures minor, 281-286  
 Swinburne's posterior urethroscope, 143  
 Sympathetic paths to genitalia, 41  
 Sympexia in posterior urethra, 598  
 Symptoms, urogenital, 155-192  
   misleading qualities of, 155  
   psychic factors in, 156-165  
 Syphilis of bladder confused with tuberculosis of bladder, 707  
   cystoscopy in, 707-708  
   prophylaxis in, calomel ointment for, 321  
   tertiary stage of, epididymitis in, 419-420  
   urethral stricture caused by, 347  
 Syphilitic epididymitis, 418-420  
   diagnosis, 419-420  
   pathology, 419  
   symptoms, 419  
   treatment, 420  
 orchitis, 429-430  
   diagnosis, 430  
   pathology, 430  
   symptoms, 430  
 Syphilitic orchitis, treatment, 430  
 Syringes, 17  
   catheter, 18  
   Keyes-Ultzmann, 17  
   in urethral instillations, 208  
   rubber bulb, in anterior urethral injections, 207  
   suction, 18  
 Systemic factors in cystoscopy, 572  
 Tarses dorsalis and neurogenic bladder, 462  
   ejaculatory failure in, 543  
   residual urine in, without obstructive lesion, 153  
   dysuria associated with, 178  
   sphincter response in, 680  
 Tables for cystoscopy, 567-568  
 Tapping of hydrocele, 421, 423  
 Teeth, infected, incidence in patients with focal infective prostatitis, 376  
 Teichmann's hemin test for blood pigment in urine, 93  
 Temperament, sexual disabilities and, 529  
 Temperature, elevation of, in prostatic abscess, 383  
   in reaction to prostatic massage, 378-379  
 Tenesmus, chemicals applied to trigone causing, 196  
   intravesical procedures causing, treatment with guaiacol and calomel, 200  
   of bladder, 178, 179  
   treatment, 179  
 Teratoma testis, metastasis due to late diagnosis, 434  
   true, 434  
 Terminal bleeding, 79  
 Test for albumin in urine, boiling and acid, 68  
   Keller's potassium hydroxide, for hemin crystals in urine, 93  
   Teichmann's hemin, for blood pigment in urine, 93  
   three glass, 83, 179  
   two-glass, 80-84, 179  
 Testes, ectopic, positions of, 432  
   structure of, 58  
   supernumerary, spermatoceles mistaken for, 426  
 Testicle, atrophic changes in, following varicoelelectomy, 426  
   atrophy of, following injury, 432  
   sexual impotence and, 536  
   carcinoma of, embryonal, 434  
   descent of, See *Cryptorchidism*  
   inflammation of, 428  
   diagnosis, 429  
   etiology, 429  
   gonococcal infection involving, 428

- Testicle, inflammation of, pathology, 429  
   symptoms, 429  
   treatment, 429  
 injury of, 431-432  
   fatality from shock in, 431  
   pathology, 432  
   symptoms, 431  
   treatment, 432  
 intrapelvic, new growth, diagnosis in, 436  
 luxation of, 432-433  
 malformation of, 428  
 malignant growths of, 434-438. See also  
   *Testicle, tumor of.*  
   diagnosis, 436  
   differentiated from hydrocele, 436  
   metastasis in, 435  
   pathology, 434  
   prognosis, 437  
   symptoms, 435  
   treatment, 437  
 neoplasm, fungating, 435  
 neuralgia of, 431  
   etiology, 431  
   treatment, 431  
 pain in, 170  
 rotation of, 57  
 size of, comparative, diagnostic importance of, 436  
 torsion of, 433-434  
   diagnosis, 433  
   differentiation from acute epididymitis, 433  
   etiology, 433  
   symptoms, 433  
   treatment, 434  
   trauma of, neoplasms due to, 434  
   tumor of. See *Testicle, malignant growths of.*  
 Testicular atrophy, incidence in varicocele, 424  
   hormone, 64  
   trauma, sexual impotence and, 536  
 Testis, blood supply of, 59  
   carcinoma of, embryonal, 434  
   lymphatics of, 59  
   nerves of, 59  
 Testosterone, 275  
   propionate in prostatic hypertrophy, 276  
 Thermal death points of bacteria, 229  
 Thorium nitrate solution in retrograde pyelography, 654  
 Three-glass test, 83  
   in pyuria, 179  
 Thrombophlebitis, scrotal gangrene due to, 408  
 Thrombosis in corpora cavernosa in priapism, 305  
 Thyroid insufficiency in enuresis, 192  
 Tissue-ageing, precocious, in focal infective prostatitis, 376  
 Tissue pressure in kidney pelvis function, 34  
 Tonsils, infected, in patients with focal infective prostatitis, 376  
 Torsion of appendix testis, 438  
   differentiated from epididymitis, 438  
   symptoms, 438  
   treatment, 438  
 of testicle, 433-434  
   diagnosis, 433  
   differentiation from acute epididymitis, 433  
   symptoms, 433  
   treatment, 434  
 Toxemia, cystoscopy in, contraindications to, 574  
   urinary, 392  
 Toxic absorption in seminal vesiculitis, symptoms of, 406  
   tolerance in treatment of focal infective prostatitis, 379  
   threshold of, 239  
 Trabeculation, habit, spinal cord lesion simulated by, 677  
   of bladder, causes of, 680  
   coarse, back-pressure and, 680  
   cystoscopy in, 679-681  
   habit, cystoscopy in, 677-678  
   median lobe hypertrophy with, 617  
   vesical, cystoscopy in, 679-681  
 Trauma from instrumentation and chemical applications, 193  
   instrumental, vesical hyperemia caused by, 669  
 Trendelenburg position in cystoscopy, 581  
   in vesical dilatation, 569  
 Treponema pallidum, differentiation from other spirilliform organisms, 154  
   in innocent-looking lesions, 153  
   search for, in paraphimosis, 292  
   urethral discharge indicating search for, 107  
 Triangular ligaments, 64  
 Trichomonads, sign of, 107  
 Trichomonas vaginalis in mucoid discharge, 347  
   infestation of prostate gland, diathermy in, 234  
   neutral acriflavine as specific in, 199  
 Tridermal malignancies of testis, 434  
 Trigonal stretch induced by extravescical lesion, 172  
 Trigone, application of strong chemicals to, causing tenesmus, 196  
   distortion of, in pregnancy, 603  
   hyperemia of, in cystoscopy, 669  
   in acute cystitis, 674, 675  
   in prolapse of uterus, 605  
   median lobe hypertrophy suggested by position of, 596

- Trigone, neurogenic stimulus for, in urination, 150  
 pain in, felt in pelvis and suprapubic region, 169  
 protection of, in cystoscopy, 578  
 role of, in symptoms of vesical calculus, 451  
 sensitivity to pain, 169  
 structure and function of, 39  
 transference of pain from lesions of, 168  
 urethral, shortening of, in median bar, 614
- Trigonitis areata alba, cystoscopy in, 694-697  
 pseudomembranous, frank, 693-695  
   obscure, 696-697  
   vesical tenesmus as sign of, 178
- Trilobar hypertrophy, 387  
 prostatic hypertrophy, 618
- Triple phosphates See *Phosphates*
- Tripperfaden, 107
- Tubercle bacillus in urethral cysts, 361  
 in urine, antiformin method for finding, 101  
   Crabtree method for finding, 101  
   significance of, 100  
   smegma bacillus differentiated from, 122
- Tuberculin in prostatic tuberculosis, 386  
 in renal tuberculosis, 500
- Tuberculosis, genital, first focus in, 384  
 prostatic involvement in, incidence of, 384  
 of bladder 443-447  
   cystoscopy in, 683-686  
   contraindication to, 572  
   reactions to, 575-576  
   secondary to renal tuberculosis, 445  
   syphilis confused with, 707  
   treatment, 446  
     collargol in, 446-447  
     guaiacol in olive oil for, 446  
     neoarsphenamine, intravenous, in, 446  
     oil of gomenol in, 446  
 of Cowper's glands, 369-370  
   diagnosis, 370  
   symptoms, 370  
   treatment, 370  
 of epididymis, 416-417  
 of kidney, 493-500  
   age distribution in, 498  
   bilateral involvement in, 495  
   burning of urination in, 498  
   course of infection in, 495  
   diagnosis, 499  
   etiology, 494-495  
   foci of infection in, 494  
   golf-hole ureteral meatus in, 633  
   hematuria in, 498-499
- Tuberculosis of kidney, mortality without operation, 499  
 operative contraindications, 500  
 pain in, 499  
 polyuria in, 174, 498  
 prognosis, 499  
 spontaneous cure in, 496-497  
 study of urine for, 100  
 symptoms, 497-499  
 treatment, 499  
 tuberculin in, 500
- of penis, 308-309  
 diagnosis, 309  
 pathology, 308  
 treatment, 309
- of prostate gland, 384-386  
 cystoscopic recognition of, 583  
 diagnosis, 385  
   instrumentation in, 385  
   differentiated from carcinoma, 385  
   pathology of, 385  
   prostatic carcinoma differentiated from, 401-402  
   symptoms, 385  
   treatment, 385-386  
     with tuberculin, 386
- of seminal vesicles, hemospemia and, 188
- of ureter, 472
- of urethra, 357-358  
 diagnosis, 358  
 dilatation in, delay of, 358  
 symptoms, 358  
 treatment, 358  
   alkalinization of urine in, 358
- pulmonary, cystoscopy in presence of, 573
- tumor of urethra as sign of, 361  
 urethral cyst following, 361  
 stricture caused by, 347
- vesical tenesmus as sign of, 178
- Tuberculous bladder, irrigations in, abandonment of, 446  
 cavitation of kidney, 497  
 cystitis, cystoscopy in, 683-686  
   pathology, 683
- epididymitis, 416-418  
 diagnosis, 417  
 surgical removal in, 418  
 treatment, 417-418
- granuloma of bladder, 446  
 involvement in epididymitis, 415
- patient, as poor risk for instrumentation, 210
- pyelitis, differential diagnosis, 485  
 seminal vesiculitis, 406  
 ulceration in posterior urethra 349
- Tumor, Grawitz, of kidney, 512  
 of bladder, 452-457  
   biopsy to confirm diagnosis of, 455

- Tumor of bladder, classification of, 453, 455  
 cystoscopy in, 621-631  
 diagnosis, 456  
 differentiation from calculus, 487  
 etiology, 452  
 hematuria from, 452  
 symptoms, 455  
 treatment, 456-457  
 ureteral obstruction from, 455  
 of brain, bladder dysfunction caused by, 464  
 of urethra, 361-363  
 diagnosis, 362  
 symptoms, 362  
 treatment, 362-363  
   electric fulguration in, 362  
   tuberculosis indicated by, 361  
 Wilms', in renal neoplasm, 510, 512  
 Tunica albuginea, 59  
 Tunica vaginalis, adhesions of, as a cause of testicular neuralgia, 431  
 testis, 57, 58  
   hydrocele of, 423  
 Two-glass test, 75, 78, 80-84  
   in gonorrhea, 316-319  
   in pyuria, 179  
   interpretation of findings, 81  
   limitation of, 329  
   positive value of, 82  
 Tyrosin crystals in urine, pathologic significance of, 97  
 Tyson's glands, 62  
 Tysonitis, suppurative, gonorrhea complicated by, 337
- ULCER, clovisse. See *Hummer ulcer*.  
 of bladder, idiopathic chronic, cystoscopy in, 715  
 Ulcerations of posterior urethra, endoscope in study for, 147  
 Upper tract infection from neurogenic infected bladder, 464  
 Urates in urine, 95  
   urinary stagnation suggested by, 96  
 Urea nitrogen retention in blood, kidney function tested by, 142  
 Uremia in renal calculus, 506  
   intravenous urography in, contraindications to, 648  
 Ureter, absence of, 468  
   anatomy of, 34  
   intramural portion, 35  
   lumbar portion, 34  
   pelvic portion, 35  
   anomalies of, 468  
   blood supply of, 36  
   calculus of, 469-472  
   cystoscopic evidences of, 633  
 Ureter, calculus of, cystoscopy in, 660-667  
   diagnosis, 471  
   operation for anuria in, 472  
   pain in, 469-470  
   roentgenography in, 660-667  
   symptoms, 469-470  
   treatment, 471-472  
   cystoscopy in, 662-667  
 carcinoma of, 473  
 catheterization of, cystoscopy and, 634-638  
   technic in, 634-637  
 changes in, during pregnancy, 659  
 coats of, 36  
 contraction of, 633  
 dilatation of, due to small orifice, 468  
   to assist descent of calculus, 664  
 diseases of, 467-474  
 function of, 37  
 in pregnancy, roentgenography and, 657-659  
 lymphatics of, 37  
 malformations of, 467-469  
 narrowings of, abnormal, 469  
 neoplasms of, 472-474  
   leukoplakia preceding, 473  
   symptoms, 474  
   treatment, 474  
 nerve supply of, 37  
 papillomatosis of, 473  
 pregnancy influencing, 657-659  
 reaction of, to chemical applications, 195  
 reduplication of, 467  
 stricture of, cystoscopy in, 667-668  
   focal infection and, 668  
   incidence, 667  
   roentgenography in, 667-668  
   treatment, 668  
 tolerance of, to silver nitrate, 197  
 tuberculosis of, 472  
 variations in structure of, 467-468  
 Ureteral block, complete, emergency operation in, 667  
   diagnosis with pyelography, 661  
   gonorrheal epididymitis suggested by, 340  
 catheters, types of, 568-569  
 colic, 469  
   in acute prolonged pyelonephritis, 478  
   in kidney rupture, 516  
   in renal tuberculosis, 499  
   pain from calculus, course of, 168  
   pyelitis preceded by, 484  
 dilator, 664  
 meatoscopy, 631-634  
   vesical dilatation in, 634  
 meatus in renal tuberculosis, 632  
   inflammatory changes in, significance of, 633

- Ureteral meatus, pain originating between ureteropelvic junction and, 168  
 mucous membrane, nervous mechanism of, 38  
 obstruction, bilateral calculous, anuria due to, 175  
 vesical tumor and, 455  
 orifice, dilatation for passage of calculus 664  
 duplication of, 632  
 locating, cystoscopy for, 601-603  
 scheme for, 589  
 misplaced, 469  
 papillary carcinoma of, 490  
 slitting of, to aid passage of calculus, 664, 666  
 reflux, 638  
 ridge, edema of, 662  
 wave of contraction, 37  
 frequency, 38
- Ureterocele, back pressure from, 668  
 cystoscopy in, 692  
 treatment, 692
- Ureteropelvic junction and ureteral meatus, pain originating between, 168  
 obstruction, effects of, 486  
 pain above, 167, 168
- Urethra, anatomy of, 44  
 anterior, 46  
 cleansing before indwelling catheterization, 224  
 cytologic effects of irritation of, 105  
 filling, method of, 330  
 gonocoeal feeding of, through Cowper's glands, 244  
 injections in, 207  
 irrigations of, 204, 205  
 pain in, 170  
 primary infection of, 71
- bulbar, 46  
 injuries to, causes of, 355  
 papilloma of 365  
 rupture of, 355  
 stricture in, 348
- bulbomembranous, susceptibility to injury, 355  
 calculus of, 360  
 diagnosis, 360  
 roentgenography in, 360  
 symptoms, 360  
 treatment, 360-361
- caliber of, instrumental examination of, 152  
 caruncles of, in female, treatment by surface fulguration, 238  
 chancre of, 366  
 congenital valves of, 367-368  
 contour of, 213  
 cyst of, tubercle bacilli in, 361
- Urethra, dilatation of, in urethral calculus, 360  
 diseases of, 310  
 diverticulum of, 358-359  
 diagnosis, 359  
 treatment, 359  
 examination of, instrumental, 151  
 function of, 48-50  
 inflammation of, in gonorrhea, 315  
 priapism following, 305  
 injection of chemicals into, preferred  
 local treatment of gonorrhea, 328  
 injuries to, 355-357  
 classification of, 356  
 diagnosis, 356  
 from internal violence, instrumenta-  
 tion and, 355  
 pathology, 355  
 prognosis, 356  
 stricture following 357  
 symptoms, 356  
 treatment, 357  
 surgical, 357  
 instillation of, 208  
 instrumentation of, 209  
 fever following, 210  
 infection of residual urine by, 211  
 pain in, 211  
 shock from, 209, 210  
 lumen of, cystoscopic study of, 618  
 malformations of, 310  
 hypospadias, 310  
 malignant growth of, 365  
 diagnosis, 366  
 prognosis, 366  
 symptoms, 366  
 treatment, 366
- membranous 46  
 as fulcrum for cystoscope, 578  
 mobile portions of, susceptibility to injury, 355  
 palpation of, for diagnosis of urethral calculus, 360  
 papilloma of, 364-365  
 diagnosis, 365  
 symptoms, 365  
 papillomatosis of, multiple, 364  
 pathogenic bacteria in, 210, 213  
 polyp of, 363-364  
 diagnosis, 364  
 structure, 363  
 symptoms, 363-364  
 treatment, 364
- posterior, asymptomatic infections of, 83  
 congenital valves in, 151  
 congestion of, cystoscopy in, 574  
 prostatic massage in premature ejac-  
 ulation owing to, 542  
 silver nitrate for involuntary emis-  
 sions from, 546

- Urethra, posterior, congestion of, silver nitrate for premature ejaculation owing to, 542
- cyst in, 361
- cystoscopic appearance in health and disease, 597-601
- elongation of, and carcinoma, 153
- prostatic hypertrophy and, 153
- gonorrhea in, signs of, 315
- involving, 331-333
- irrigations of, 204, 205-207
- lymphocystic bodies on, 599
- pain from disease of, reference to fossa navicularis, 169
- primary infection of, 71
- scar tissue in, 601
- sexual function and disease of, 532
- structure, 44
- study of, indispensability in cystoscopy, 559
- sympexia in, 598
- technic of passing straight instruments into, 144
- vesical sphincter hernia and, 616
- pseudopolypi of, 363
- rupture of, mortality from, 357
- sarcoma of, 365
- sensitive areas of, 211, 582-583
- solution in, method of retaining, 331
- stricture of, 347-355. See also *Stricture of urethra*.
- dysuria caused by, 177
- hydronephrosis caused by, 486
- in nonspecific urethritis, 345
- injury followed by, 357
- spermatorrhea in, 190
- urethral sound in dilatation of, 212
- vesical diverticulum and, 449
- transference of pain from lesions of, 168
- tuberculosis of, 357-358
- diagnosis, 358
- dilatation in, delay of, 358
- symptoms, 358
- treatment, 358
- alkalinization of urine in, 358
- tumor of, 361-363
- diagnosis, 362
- electric fulguration in treatment of, 362
- symptoms, 362
- treatment, 362-363
- tuberculosis as sign of, 361
- valves of, congenital, 367-368
- vesical pain referred along, 169
- Urethral adenoids, 361
- canal, cleansing of, prior to instrumentation, 213
- chill, 210
- in mild pyelonephritis, 478
- circulation, 607-608
- Urethral discharge after disappearance of gonococcus, 342
- bacteria in, interpretation of, 106
- from small prostatic abscess, nature of, 381
- nonspecific, secondary to prostatic infection, 345
- zinc sulfate in, 201
- profuse purulent, without bacteria, significance of, 107
- purulent nonspecific, 343
- secondary to balanoposthitis, 106
- fever, pathology of, 476
- instrumentation in prostatic obstruction, 393
- meatus, choice of catheter size influenced by, 217
- secretion, increases in, transitory, 346
- smears, 75
- cytologic classification of, 104
- stricture, rarity of certain types common in adult life, 151
- valves, congenital, hydronephrosis caused by, 486
- Urethritis, anterior, gonorrhea treated as, 315
- nongonorrheal, neosilol in, 198
- gonorrheal, foreign-protein injections in, 255
- irrigation for, position of fountain in, 202
- nongonorrheal, age incidence of, 344
- nonspecific, 343-347
- differentiation from gonorrhea, 343
- exciting factors in, 344
- incidence of, 343
- influenzal epidemics and, 346
- neosilol in, 346
- postcoital, 346
- recurrences of, due to mucosal hypersensitivity, 345
- treatment, 345-347
- mild protein silver in, 345-346
- potassium permanganate in, 346
- posterior, infections elsewhere reflected in, 209
- two-glass test in, 81
- yeast cells in discharge of, 346
- Urethrography, 135
- Urethroscope, Geiringer, 144
- Koch's, 143
- Otis, 143
- posterior, Swinburne's, 143
- trauma from, avoidance of, 146
- types of, 143, 144
- water-dilating, choice of, 147
- Young's, 143
- Urethroscopy, 142-147
- position of patient for, 144
- Urethrotomy, 353

- Urethrogram, focal infective prostatitis due to, 377  
 gonorrheal prostatitis associated with, 372  
 cystoscopy in, contraindication to, 706
- Uric acid crystals in urine, significance of, 95
- Urinalysis by urologist in office laboratory, 77  
 equipment for, 77  
 in urinary frequency, importance of, 173
- Urinary acidifiers, 249  
 alkalisers, 249  
 antiseptics, 250-252, 256-262  
 dosage of, 251  
 crystals 93-97  
 dysfunction prostate obstruction indicated by, 388  
 fistulae, 349, 351  
 obstruction, urethral stricture in, 350  
 picture in gonorrhea causes of unclear, 328-329  
 retention, alkaline reaction and, 85  
 mercurochrome 220 as bactericide in, 199  
 olive-tipped catheter used to avoid vesical puncture in, 152  
 shreds caused by potassium permanganate irrigations and prostatic massage, 220  
 overtreatment with irrigations, 205  
 instrumental trauma as a cause of, 110  
 preparation of, for study, 100  
 stagnation, triple phosphate crystals as signs of, 78  
 stasis calculi in, absence of, 505  
 cystoscopy in, danger of, 663  
 triple phosphates as indication of, 93  
 stream, caliber of, symptomatic of urethral stricture, 352  
 in neurogenic bladder, 464  
 narrowed, diagnosis of, 151  
 postgonorrheal stricture and, 151  
 starting, difficulty of, in advanced age, 164
- Toxemia, 392
- Tract, lower, obstruction, common causes of, 151  
 strictures in, 151  
 treatment by hydrostatic irrigation, 203  
 middle and upper, cystographic evidence of abnormalities of, 134  
 upper, infection of, cystoscopy in, 638-640  
 shown in two-glass test, 81
- Urination, bladder pain associated with, 169  
 brain in, role of, 157  
 burning on, in urethral tumor following in tuberculous, 362  
 Urination, burning on, in gonorrhea, 315  
 dependence upon volition, 157  
 disturbances of See *Burning, Frequency, Incontinence, Retention*  
 dribbling after, faulty habit causing, 160  
 fibroid to assist, in urethral stricture, 354  
 frequency of, etiology of, 170  
 importance as symptom, 170  
 in renal calculus, 508  
 in vesical calculus, 451  
 intrinsic causes, 173  
 mental impressions underlying, 158  
 neurogenic, 172  
 neuromuscular unbalance in, 171  
 nocturnal, in urethral stricture, 352  
 opium suppositories for relief of, 248  
 perineal spinal cord lesions causing, 172  
 psychic factors in, 171  
 psychogenic, following pathologic bladder condition, 173  
 psychotherapy for, 159  
 injuries to urethra, effect upon, 356  
 mental fixations and, 159  
 neurogenic dysfunction in, 463  
 physiology of, 150, 457  
 psychopathologic behavior relative to, 158  
 straining at, diverticulum of bladder and, 418  
 hydronephrosis caused by, 486  
 hypertrophy of fascicular bands from, 159
- Urine, acidification of, 249  
 albumin in, 88  
 Exton's test for, 89  
 nitric acid test for, 89  
 Purdy's test for, 89  
 alkalinity of, in incrustated cystitis, 702, 703  
 alkalization of, 249  
 bacteria in, 92  
 bile in, 89  
 bladder, in catheterized kidney urines, avoidance of, 123  
 blood in, 79, 181-183  
 calcium oxalate crystals in, 183  
 phosphate calculi in, 184  
 chyle in, 90  
 color of, 84  
 culture findings, table of, 259  
 epithelial cells in, 91  
 extravasation of, bulbo-urethral rupture and, 355  
 in urethral injuries, 356  
 stricture, 351  
 need for operation, 353  
 failure of, to flow through catheter  
 significance of, 461  
 fat in, reasons for, 186

- Urine, glucose in, 87  
 in incrustated cystitis, 701  
 incontinence of, 173, 174  
 differential diagnosis of, 174  
   neurogenic bladder as a cause of, 462  
 infected, motile bacilli in, 117  
 kidney, separate, 643-644  
 leukocytes in, normal limit of, 179  
   source of, 179  
*mucus in*, 82, 90  
 odor of, 84  
 output of, 171  
   factors affecting, 85  
   normal twenty-four-hour, 32, 85  
 phosphates in, 82, 184-185  
 preparation of, for study by Gram's method, 99  
 pus cells in, 91  
   differentiation from epithelial cells, 91  
   source of, 179  
   specific gravity and, 91  
 pus in, 179-181  
 quantity of, 85  
   at night, effect of age upon, 85  
 reaction of, diet and, 85  
   in indigo carmine test, 139  
   in phenolsulfonphthalein test, 139  
   normal, 85  
 regurgitation from bladder to ureter, prevention by valve, 38  
 residual, cystoscopy in, asepsis for, 614  
   cystoscopy in, reactions to, 576  
   infection of, by urethral instruments, 211  
   value as indication of obstructive lesion, 153  
   withdrawal during cystoscopy, 587  
 retention of, acute, 457-461  
   childbirth followed by acute, 461  
   compressor urethrae in, rôle of, 458  
   etiology, 458-459  
   gonorrhea complicated by, 336  
   hemorrhage in, 459  
   instruments in, 460  
   obstructive causes, 458, 459  
   pain in, 457  
   postoperative, 461  
   prognosis, 459  
   treatment, 459-461  
   blood-clot in bladder leading to, 460  
   hot sitz bath for relief of, 228  
   in infancy and childhood, 458  
   in urethral stricture, relief of, 353  
   operation for, contraindications to, 222  
   prostatic abscess, 383  
   psychotherapy for, 159  
   vesical decompression for cystoscopy in, 577-578  
   specific gravity of, 86
- Urine, spermatozoa in, 189  
 stagnation of, calculi formed from, 391  
   in bacteriuria, 185  
 stasis of, in vesical calculus, 451  
 sugar in, 87  
   Benedict's test for, 87  
   quantitative method for testing, 88  
   suppression of, in renal calculus, 508  
   trends in gonorrhea, 316-319  
   yeast cells in, 79, 90
- Urinometer, 87
- Urogenital infections, characteristics of, 66  
 organs, relation to other structures, 29  
 pathology and sexual function, 532  
 symptoms, 155-192  
   psychic factors in, 156-165  
   psychotherapy for, 159, 160, 163  
   value of, 155  
 system, divisions of, regarding pain, 167  
 tract, outline of, 37  
   staining reactions of bacteria common to, 103  
   upper, contraindication to infection of, 78
- Urography in nephroptosis, 520  
 in ureteral neoplasms, 474  
 intravenous, catheter pyelography and comparison of, 648  
 contraindications to, 648  
 technic of, 649  
 secretory, in renal injury, 517
- Uroselectan, 649
- Urticaria, bladder irritation and, 708
- Uterus, displacement of, intravesical changes in, cystoscopy for, 604  
 prolapse of, 605
- Uvula, vesical, 607, 608
- VACCINES, 253-255  
 autogenous, during course of prostatic massage, 380
- Valves, congenital, of urethra, 151, 367-368  
 fulguration in treatment of, 368  
 hydronephrosis caused by, 486  
 meatotomy in treatment of, 367  
 types of formations of, 367
- Vanicocele, 423-426  
 age incidence in, 423  
 diagnosis, 425  
 etiology of, 423-424  
 pathology, 424  
 renal neoplasm with, 514  
 sexual congestion in, 424  
 "symptomatic," 424  
 symptoms, 424  
 treatment, 425
- Varicocele, follow-up study of, 426
- Varicosities in aged bladder, 591



- Varix, vesical, cystoscopy in, 711-712  
 Vas deferens, 53, 55  
   coats of, 55  
   infection in, location of pain accom-  
   panying, 340  
   lymphatics of, 53  
   occlusion of lumen of, 53  
 Vasectomy in nonspecific epididymitis, 415  
   spermatozoa present after, 415  
 Vastitis, acute, differentiation from appen-  
   dicitis, 170  
   pain in, 170  
 Venereal disease, fourth See *Balanitis*,  
   *erosive*  
   wart 293  
   treatment, 294  
 Venous dilatation of varicocele, 424  
 Verumontanum, 45  
   absence of, apparent 601  
   avoidance of, in destroying urethral  
   tumor, 367  
   congestion of masturbation and, 532  
   endoscopic view of, 597-598  
   enlargement of, in masturbation, 679  
   fulguration of, 601  
   masturbation and, 598  
   sexual function and, 533  
   neurosis and loss of, 363  
   silver nitrate on, effect of, 600  
 Vesical See also *Bladder*  
   outlet, obstruction of, 151  
   sphincter, function as part of detrusor  
   muscle, 39  
 Vesicles seminal, diseases of, 404-406  
   function of, 65  
   infections of, types of, 405  
   location of, 53  
   stripping of, 243  
   structure of, 53  
 Vesiculectomy and vesiculotomy, 339  
 Vesiculitis, seminal, differentiated from  
   associated prostatitis, 405  
   prostatic infection and, 405  
   symptoms, 405-406  
   treatment, 406  
   tuberculous, 406  
 Vesiculography, epididymitis caused by,  
   137  
   value of, 136  
 Vincent's bacillus in erosive balanitis, 298  
   organisms in balanoposthitis, 288  
 Visceroptosis, nephroptosis and, 518  
 Vitamin A, daily requirements, 270  
   deficiency, 270  
   determination of, by dark adapta-  
   tion test, 271  
   etiology leads from, 271  
   manifestations of, 270-271  
   phosphaturia associated with, 184  
   vesical leukoplakia due to, dark-  
   adaptation test for, 713  
   oleum percomorphum yield of, 768  
   physiologic action, 270  
 V, 271-272  
   physiologic activity and deficiency, 271  
   spermatogenic function and, 271  
 K, 272  
   clotting time reduction with, 272  
 Vitamins in sterility, 441  
   in urology, value of 269-272  
 Volitional control of urinary tract, 49  
 Wappler operating cystoscope, 538  
 Wart, venereal, 293  
   treatment, 294  
   by surface fulguration, 238  
   with salicylic and acetic acids 200  
 Wassermann test for tuberculous epididy-  
   mitis, 417  
   in chaneroid, 293  
 Weight, loss of, in chronic vesical dis-  
   tention, 392  
 Wilms tumor in renal neoplasm, 510, 512  
 Wolffian body, 27  
 x Ray See *Roentgenography*, etc  
 x Ray catheters, 568  
 Xylene, foreign bodies in bladder dis-  
   solved by, 720-721  
 Yeast cells in nonspecific urethral dis-  
   charge, 346  
   in urine, 79, 90  
 Young's cystoscopic rongeur, 539  
   urethroscope, 143  
 ZIEHL-NEELSEN solution See *Carbolfuchsin*  
 Zinc ointment for intertrigo, 413  
   salts, 200, 201  
   sulfate in nonspecific urethral discharge,  
   201